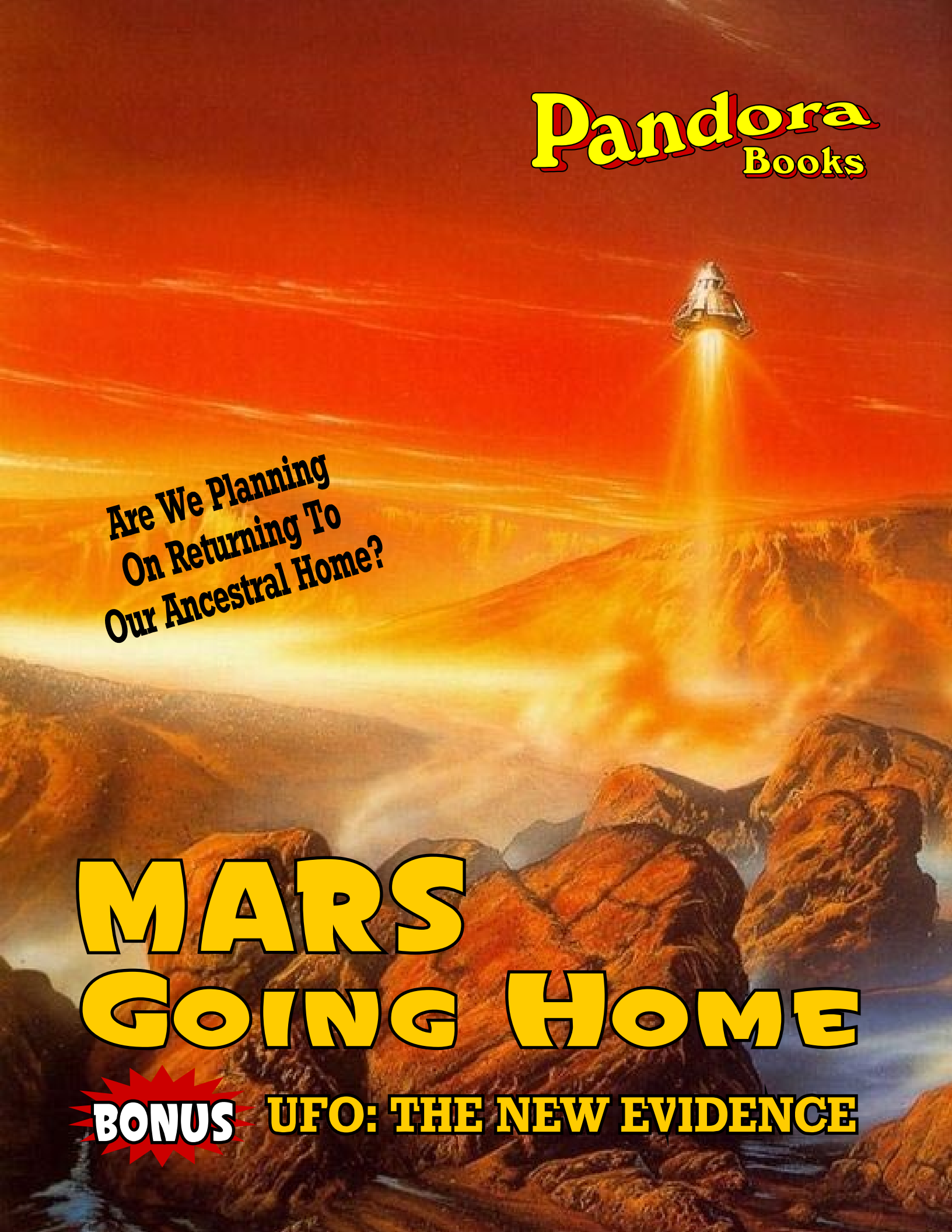
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MARS: GOING HOME

MARS: GOING HOME

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MARS: GOING HOME

1. Prologue

Freedom is a heavy load; a great, strangling burden for the spirit to bear. It is not easy; it is not a gift given, but a choice made, and the choice made may be difficult, indeed. The road leads upwards toward the light but the laden traveler may never reach the end of it. Man approaches the unattainable truth only through a succession of errors; affliction comes to us, not to make us sad, but sober; not to make us sorry, but wise.

You will err no matter where the road may lead you; that's the basic condition of life required to establish your own identity. At some point every creature that lives must do so. It is the ultimate shadow, it is the verification of creation. Yet, it is the curse at work, the curse that feeds on all life everywhere in the universe.

The gravest error a thinking person can make is to believe that one particular version of history is absolute fact. History is recorded by a number of observers and none of them are impartial. It is change that is the dominant factor in society today. Sensible decisions can no longer be made without taking into account, not only the world as it is but the world as it will be. The saddest aspect of life right now is that science gathers knowledge faster than society gathers wisdom.

Each generation imagines itself more intelligent than those before and wiser than those that will follow. Man is the unnatural animal, the rebel child of nature and more and more does he turn himself against the harsh and fearful hand that reared him.

It doesn't matter what you do as long as you change something from before you touched it into something that is like you when you take your hands away. The very concept of truth is fading away from this world and biological human minds will pass into history. Solitude and isolation are painful things often beyond human endurance, for small creatures such as we will endure only through love.

Power in defense of freedom is greater than power in behalf of tyranny and oppression because power—real power— comes from our convictions

which produce uncompromising action. Every daring attempt to make a great change in existing conditions, every lofty vision for the possibilities of the human race has been labeled "Utopian." Like it or not, everything is changing. The result will be the most wondrous experience of humanity or the most horrible enslavement we can imagine. We must draw our strength from the very despair in which we have been forced to live. We were born with potential, we were born with goodness and trust. We were born with ideals and dreams. We were born with greatness.

We are the universe in search of itself and it does not require many words to convey that truth. The ultimate end of all revolutionary social change is to establish the sanctity of human life, the right of every human on the planet to liberty and well-being. Do not allow yourself to become entangled in the fear of change; remember: the greatest wound is where the brightest light will enter. We are here to laugh at the odds and live our lives so well that death will tremble to take us.

2. MARS: GOING HOME

Currently, there is a race to get off the planet.

This is what all of human history is about, this present moment where we migrate into space. This is very much about humanity setting up a permanent outpost on another planet.

Either we prepare to leave the Earth, or we prepare to die.

When humans become the alien visitors on other planets, what, or whom, will they encounter? What if we arrive on Mars, and there are artificial structures? There is alien intelligence, and our government knows about it. And that has to break out if we're going to go beyond Earth.

As a new generation of astronauts prepares for life on other worlds, are they simply realizing mankind's future, or returning to its extraterrestrial past? We're very near a discovery where we're going to understand that everything that ancient astronaut theorists have been talking about is true.

The Mojave Desert, California. May 29, 2018.

Virgin Galactic's SpaceShipTwo Unity lifts off from the Mojave Air and Space Port under the power of a carrier jet named VMS Eve.

Three, two, one. Release.

At 50,000 feet above the Earth, the Unity is dropped from its mother ship and rockets upward to an altitude of 114,500 feet, before descending back to Earth. The Unity is the brainchild of billionaire entrepreneur Richard Branson. It represents a new era in space exploration, as it is designed to carry not only astronauts, but civilians. Right now is an amazing time to see what's happening with the world's space exploration. You have commercial entities that are building rockets that we're actually using to get to the Space Station, and maybe even to Mars in the very near future.

We've got people talking about putting colonies on the Moon and on Mars. And we also are now talking about a Space Force that's very similar to

what you might have heard in the old days of like the Starfleet Academy in Star Trek and other science fiction stories. Within a few short generations, we're likely to have people being born as Martians. We will soon be the Martians.

So we are really reaching a point where space is right there, right for us to reach out and grab. Today, a new 21st-century space race has captured mankind's collective imagination. Not since the Apollo program's history-making Moon landings has there been such interest in and hope for a return to manned missions to explore other places in our solar system. Although only the United States, Russia and China currently have human space flight capabilities, dozens of other nations, in addition to well-funded corporations, are committing unprecedented resources to join this exclusive club.

I'm old enough to remember that first small step that Neil Armstrong took. And, at the time, I think we all believed it was the first step on a stairway to the stars; one small step for man, one giant leap for mankind. And then, after a few years, everything seemed to stall, people lost interest. What we're seeing in recent years is other nations getting into this, and so particularly China, and also India with the prospect that we'll be blazing a new trail to the stars. We're entering the second golden age of space exploration.

This is not a prediction, but a gut-feeling: I believe China will beat America to Mars.

Even Silicon Valley billionaires are jumping into the game, funding their own fleet of rockets.

NTS is ready for launch. There's Falcon Heavy. Elon Musk shot that Falcon Heavy rocket from Cape Canaveral. Millions watched it online. Why? Because that was a Moon rocket.

For the first time in 50 years, a Moon rocket, capable of putting astronauts on the Moon, took off from Cape Canaveral. And now, Jeff Bezos, the richest man on the planet, has funded his own private space port in Texas, with a fleet of rockets, one of which we think is designed to go to the Moon.

Many experts have suggested that space exploration slowed down after the initial Apollo Moon missions because of the staggering costs. So, what is driving humankind to once again undertake such an expensive endeavor? It is a law of nature that organisms have to either leave, adapt or perish.

99.9% of all living forms on the Earth have gone extinct. Extinction is the norm. If you don't believe me, simply drill right under your feet until you hit the bones. Backing up the biosphere, so to speak, backing up humanity into

a multitude of different locations makes a lot of sense.

One of the quotes I love comes from Tsiolkovsky, who's one of the Russian founders of the whole space movement, and he said, "Humanity was born in the cradle of Earth, and we should not always remain in the cradle."

I think that it's an inevitability. As humans, we love to explore. We began in the savannahs of Africa and moved throughout the entire planet, and that made us a robust species. And so that will continue as we move off the planet. It would appear that there is a genetic survival mechanism we have which says that we must explore, and we must move on beyond the next horizon. I think that's built into us.

For humans to thrive on alien worlds, they must first learn to overcome profound technological, physiological and even psychological challenges. But they must also face something even more daunting: what if they encounter other intelligent beings? The idea of intelligent life, of sentient life being confined to the Earth is just a human-centered, anthropocentric idea that we've got to get rid of. In our Milky Way alone, there is reckoned to be 140 billion planetary systems that are not too dissimilar to the Earth and the solar system.

The Kepler satellite has allowed us to create a census of the Milky Way galaxy. We now know that, on average, every single star has a planet going around it. And of them, we know that a fraction of them maybe one out of 20 or so have Earth-like planets going around them. In other words, the Earth could have a doppelganger. The Earth could have a twin in outer space. And how many of them? Billions. Billions of Earth-like planets.

And so, for us to assume that we are the only game in town, I think, is ridiculous. As far as ancient astronaut theorists are concerned, evidence that there is other intelligent life in the universe has already been found on every corner of the globe. They believe Earth has been visited by intelligent beings for thousands of years, and that it most likely began during the time of the ancient Sumerian kings.

Khorsabad, Iraq. March 23, 1843.

While excavating for archaeological treasures, a group of men, led by French scientist Paul-Emile Botta, came upon the remains of a huge Assyrian palace, and within it, an abundance of Sumerian cuneiform inscriptions. When translated, the inscriptions told of what archaeologists believe to be the world's oldest civilization, and a group of powerful beings called the Anunnaki. "Anunnaki" was a term of the gods used by the ancient Sumerians.

But the original form of it, it simply meant, "the sky people." It meant those that were connected with the stars. The Anunnaki were seen to be the givers of civilization to mortals. And they are described as having these shining eyes, and having a radiance and an otherworldly feeling about them. Based on 30 years of studying the Sumerian cuneiform tablets, in 1976, author and researcher Zecharia Sitchin published a book called The 12th Planet, in which he proposed that the Sumerian gods were, in fact, refugees from another world. According to Sitchin's interpretation of the tablets, these alien visitors, the Anunnaki, created humankind.

It appears to be that gods came down and literally started a colonization project here on Earth, creating us in their image and after their likeness. It also might stand to reason, then, that they've infused us with a desire to then spread this colonization project beyond Earth. I think if you look at what we've been doing in our space program, it's a blueprint for what may have happened here a long time ago with extraterrestrials. But I think we're on the same path.

We're beginning to understand that the Anunnaki gods that were actually ETs could be throughout the universe, that we could now, as we are starting to head out into space, be encountering the prime intelligence that originally had civilizations on Earth and were working throughout this solar system.

Are today's astronauts simply repeating an ancient pattern, that of exploring the universe with an eye toward future colonization? But, if so, what will become of the planet they leave behind? Perhaps further clues can be found by taking a closer look at our most likely destinations.

Houston, Texas. June 7, 2017.

At Johnson Space Center, Vice President Mike Pence announces NASA's 2017 astronaut class.

"As American astronauts, you may yet return our nation to the Moon. You may be the first to travel to Mars. You may have experiences that we can only imagine, those of us who walk on terra firma."

These 12 men and women were chosen from a record 18,300 applicants, more than doubling the previous record of 8,000 set four decades earlier in 1978.

Today, humankind's desire to travel to space has never been greater, and establishing colonies off Earth is not only a possibility but a priority. The only question is, where will we go first? In the near term, there are three

basic locations: there is going to the Moon, there is going to Mars, and then there is free space. This is going to the asteroids, and using the asteroidal materials to build colonies. I think you can look at all three of those as options in the near term.

I firmly believe that a single-planet species is not long to survive and that we really have to be able to move out into the solar system. Early on in the evolution of the solar system, we believe Venus, Earth, and Mars had a significant amount of water. And they all evolved differently. Venus went through a runaway greenhouse effect. The water evaporated, and now the temperature is so high and the pressure is so high, it's a place we just can't inhabit.

And when you think about that, what is the next place for humankind to go? It's Mars. It's smaller than the Earth, but it's got a lot of the basic characteristics and it's a great place to start and work from. I think the most common misconception about Mars is that it's going to be easier than it actually is.

Right now, the International Space Station is orbiting 250 miles above us. The Moon is 250,000 miles away, a factor of a thousand. The trip to Mars will take you on a trip that's 250 million miles away. This is not a simple rocket trip.

Wernher von Braun built the Saturn V rocket to get astronauts to the Moon. We took three days to go there in the Saturn V. Going to Mars is at least 240 days, given current technology. And that's not an easy trip.

While a manned mission to the Red Planet will be a long and perilous journey, experts say Mars has many advantages for human colonization. Temperature fluctuations are less extreme than those of the Moon, for example, and its gravity is more Earth-like. People don't seem to be terraforming the Moon (at least that's the notion). Mars is a little easier. Mars already has an atmosphere. There's a lot of real estate. I mean, you could do this.

For thousands of years, Mars has practically been a human obsession. Even before it was known to be a planet, it was distinguished from the other nearby stars by its deep amber color. Mars was referred to as Nergal by the Babylonians, the great hero, also a god of war. In Greece, they referred to Mars as Ares, the god of war. The god Mars, the god of war, the god of aggression comes from this particularly visible heavenly body.

And I wonder if the desire, the quest, the yearning to explore Mars has

an aggressive or competitive element to it, if Mars himself is not somehow involved in the project.

The ancient Egyptians had a very particular interest in Mars. Cairo was named after Mars: al Qahirah. It means the vanquisher, or the conqueror. Even the Sphinx itself was believed to have originally been painted red, perhaps an homage to Mars.

Over the centuries, humans have conceived numerous and often humorous notions of what Mars and its possible Martian inhabitants might look like up close. It has been the subject of countless books, motion pictures and even video games. But what if some of the creative depictions of our interplanetary neighbor don't come from human imagination, but from human memory? Carl Jung theorized that mankind had a collective consciousness, and this is a kind of genetic memory, or inherited memory.

For instance, if our ancestors perceived that lightning was dangerous, we might inherit, then, a fear of lightning. And so it's possible in the same way that our ancient associations with Mars are actually within our genes and embedded in our neurons as part of our DNA. If our ancestors experienced something, it goes into our genome. It goes into our DNA.

What if humanity originated on Mars and we are still answering to that call unknowingly? Could there be a profound connection that links humans to Mars deeply embedded in our subconsciousness? Theorists say yes, and suggest the answer is slowly being revealed as we get closer to colonizing the so-called Red Planet.

Amersfoort, the Netherlands.

A private Dutch organization known as Mars One announces a global mission to establish a permanent human settlement on Mars. The following year, they begin accepting applications from would-be colonists for a manned expedition scheduled for 2023. But while the opportunity to be among the first humans on Mars is an exciting one, one aspect of the mission seems certain to turn away many would-be applicants. It will be a one-way trip. Nevertheless, thousands of people apply.

‘‘By the time I heard about Mars One, I had been telling all my friends, I don't care what it's going to take, I'm going to make it to space in my lifetime. And it felt like there was a calling, a destiny there. I get asked if it's worth the sacrifice of leaving everything I've known on Earth family, friends, sunshine, rain, the beach and I think to live the first half of my life as an earthling, and the second half as a Martian, what an amazing way to kind of

give your life to the greater cause of humanity. This is a defining point in the human time line.

"So, I suppose the biggest thing that draws people to Mars One, the thing that kind of hooks their attention, is the fact that it's a one-way mission. This is very much about humanity setting up a permanent outpost on another planet, and that's I suppose, the thing that drew me to it in the first place."

Mars and Earth have to be in a very synchronous place in order to make the shortest trip to Mars. When you get there, Earth and Mars are going to be very far apart and you will not be able to leave and come back for at least 400 days. In fact, it would take you longer to get back if you left right away than if you waited 400 days to come back. So once you get there, you're stuck, and you have to stay there. And the truth is that it's so expensive to get people to Mars and to establish the first colonies that this is always, always going to be a one-way trip. I don't like the idea that we do the same thing that we did with the Moon 50 years ago, where we go there, walk around, explore it a little bit, and then come back, and then sort of ask the question: Why bother going there? We've been there before.

The most common attribute through all of the candidates is this idea that we're all interested in serving something that's bigger than ourselves as an individual. It's very much about doing something for the species. The journey to get to Mars is very similar to the first settlers arriving in the Americas. Mars One plans to send teams of four at a time, and every two years afterwards, there will be a new team to arrive and join the community.

Eventually, probably, we're going to see tens of thousands of people arrive. I think for us right now, if we make the leap and start to create colonies off planet, we're looking at the next giant leap of humankind. Are current efforts to leave Earth and travel to Mars simply based on a desire to explore and colonize a new world? Or could it be based on something even more profound? Is it possible that we wish to return home to humankind's place of origin? As far as ancient astronaut theorists are concerned, further clues still need to be examined, starting with recent discoveries made on Mars that point to evidence of life.

July 20, 1976.

NASA's unmanned Viking 1 orb iter and lander touches down on the surface of Mars. Three weeks later it is joined by its companion, the Viking 2. For the first time ever, humanity has established a presence on another planet.

MARS: GOING HOME

The Viking landers actually landed on Mars and took a sample. But they landed in one spot and they stayed in one spot. We've since sent the Pathfinder Sojourner. And for the first time, we have a system on Mars that, if we see something shiny over there and we want to go check it out, we'll send the rover and get a very close look at it, take samples, get high-definition video from it. That is a very good start for figuring out where people need to go when we get ready to send them there.

In 2012, the Curiosity rover landed on Mars' Gale Crater. It was the most ambitious Mars mission flown by NASA to date. One of its objectives was to gather data that will help scientists determine what is needed to make the planet more habitable for human exploration.

In June 2018, scientist and aerospace engineer Dr. Travis Taylor traveled to Johnson Space Center in Houston, Texas. There, he met with NASA exploration mission scientist Dr. Elizabeth Rampe. Dr. Rampe analyzes data obtained by the Mars Curiosity rover, which, six years into its mission, is sending back some of its most extraordinary findings yet. So there was very late breaking news recently from the Curiosity rover, and some interesting information came out of the sample analysis at Mars or SAM instrument.

SAM can measure gases in the atmosphere, and it can also measure gases that are evolved from samples. So basically, we drill a rock, deliver that powder to the instrument, and then that instrument heats up the sample and measures the gases that are coming off. Whatever outgasses, it can tell you what that is. So a big piece of information from the atmosphere is that we've been tracking methane over the last few Martian years. And what we see is that there is a cycle to it, where it spikes late summer, early autumn, and then dips again.

So the big question is: Why is that happening? So that could possibly be due to an organic material. Or a biological source. Meaning life. It's not the only hypothesis out there, but, you know, there is the possibility that there is extant life on Mars that is creating this methane. The fact that NASA has now released information that they've measured a cycle of methane that goes up in the summer and down in the winter, it sounds very similar to how biological processes create methane here on Earth. That could be evidence that there's life, right now, on Mars.

Life on Mars? According to NASA, such a profound notion is a distinct possibility. But although the space agency is still working to confirm their findings, ancient astronaut theorists remain confident of the outcome. They

have maintained for decades that not only does the Red Planet contain life, but that it was once home to a highly advanced extraterrestrial civilization. And for their proof, they point to the existence of possible structures found on its surface.

There are lots of claims of photographs showing different features on the surface of Mars. These have come from the orbiters that are obviously taking pictures as they go around, all the time. And some people will find different features, and interpret them as geometric or rectilinear structures that suggest civilization. You see everything you would expect to see if you went to someplace on Planet Earth 50,000 years from now, when the human race have been wiped out. They clearly are technological objects that have become fossilized. While the notion that an ancient civilization once existed on Mars may sound farfetched, NASA has continued to make discoveries that could reveal something even more incredible: that life on Earth actually originated on Mars.

So what is this? Tell me what this is. This is a Martian meteorite. So this is a rock that came from Mars. How long ago? The rock itself is about 180 million years old, so that's when it crystallized on Mars. And to give you some context, 180 million years ago, dinosaurs were roaming the Earth. Well, we know that this rock came from Mars. So if there was organic material on Mars three and a half billion years ago, something could have caused that organic material to go from there to here, right? And what's interesting about, you know, "three and a half billion years ago" is that's when life was taking hold on Earth. So Mars was once very Earth-like with rivers and lakes. So why not Mars? We've got all the building blocks for life on Mars, so why couldn't it happen there? It's very possible that we're descendants of Martians. I'm not going to rule that out.

There have been a lot of changes in my lifetime about speaking about life on other planets. "Is it possible that humanity evolved from Mars?" If I would have said that ten years ago, people would have thought I was crazy. And what that tells me, though, is the conversation has changed.

While NASA's most recent findings suggest that there may be life on Mars, and that life has potentially existed there for billions of years, is it also possible that Mars was the original source of life here on Earth? Since 1974, Dr. Chandra Wickramasinghe has advanced an intriguing theory known as panspermia. He maintains that carbon-based matter exists amidst space dust and can be carried, via asteroids and comets. The standard position is that life started on the Earth in the very small primordial soup.

And the Earth is a very small place, in terms of cosmic distances and cosmic sizes. It's a speck of dust. So to argue that the most complicated system that we can ever know about, which is life, started here on the Earth, is almost a travesty of common sense. I think the first life is certainly—there's no question that it came from space.

The first thing to say about the origin of life on Earth is that we really have no idea how, where or when it happened. But there's one scenario that does work, in my view, very well, and that is impact ejector. Mars takes a hit, Mars rocks come here to Earth and Mars material is raining down on Earth all the time. If there were any life on Mars, it would be conveyed to Earth in this impact ejector. And so it's entirely possible, in my view, that life started on Mars and came to Earth only later, when conditions here settled down.

In 1953, British geneticist Francis Crick along with American biologist James Watson discovered that the shape of human DNA resembles that of a three-dimensional double helix. But as Crick learned more about our genetic code, he came to the conclusion that it was so complex, it could not have developed by mere evolutionary chance. He also believed it did not originate on Earth. When we hear terms like panspermia, this really resonates with the ancient astronaut theory because it confirms the idea that life has arrived on Earth whole and complete, and that the evolutionary process for life even to begin would take a much longer lifespan than even Earth was able to provide.

This raises the question, is it possible that life doesn't just randomly arrive, but is actually sent here to Earth? If, as ancient astronaut theorists believe, life on Earth was seeded here by extraterrestrials millions of years ago, did they have a plan for humanity? Perhaps further clues can be found by examining the ancient Sumerian stories about the earthly activities of the gods.

In 2017, NASA's Advanced Exploration Systems division asserted that identifying and extracting mineral resources in space such as iron, tungsten and titanium would be essential for future space exploration and colonization. The Moon and the near-Earth objects that are not too far from Earth, they're loaded with minerals and raw materials.

You can look at the Moon and the Sea of Tranquility and the other seas, they have a different coloration, because there's titanium oxide covering the surface. We know there's uranium there because we've detected radon

gas. So there's all sorts of materials.

One of the companies I'm proud of having cofounded is a company called Planetary Resources, who's got a vision of going to near-Earth asteroids to mine those asteroids for fuel, and ultimately, precious metals platinum-group metals, or construction metals. But as NASA makes plans to mine essential space minerals, is it possible that other advanced civilizations came to Earth centuries ago for the same reason? As far as ancient astronaut theorists are concerned, the answer is yes, and they believe the evidence can be found in the Sumerian stories of the Anunnaki, written more than 5,000 years ago.

When we analyze the story of the Anunnaki's creation of humanity, some very interesting nuances come out that might lead into understanding what humans might face in their own eventual colonization of another planet. When famed ancient astronaut theorist Zecharia Sitchin studied the Sumerian tablets in the 1970s, he not only reached the conclusion that the Anunnaki came to Earth to escape a dying planet, but also noted that, while here, they used humans to mine for gold.

When we look at the creation stories of biblical tales, we understand that God created the Earth in seven days.

It turns out that this consolidated version of seven days can be translated to a much earlier story in Sumerian form, called the "Atra-Hasis," where there is actually seven tablets of creation, telling how the Anunnaki came to Earth and genetically engineered us in their image, and in their likeness, to mine the gold for them here on Earth. Is it possible that when the ancient Sumerians wrote about giant beings coming down from the sky and digging for gold, they were, in fact, documenting a visitation by extraterrestrials who were mining for resources just as NASA is planning to do in the not-too-distant future?

June, 2018. Scientist and aerospace engineer Dr. Travis Taylor is at Johnson Space Center's Building 9, the astronaut training facility. He is meeting with robotics engineer Lucien Junkin, who is eager to show him the latest in extraterrestrial transportation. "I see this is a rover. Tell me a little bit about it."

Yeah, this is basically an off-roading RV for Moon and Mars. And what is it that makes this so much better than, say, the lunar rover? It can go out and explore. So the concept is if you have a habitat, you're going to take two of these rovers and they'll go out for a week to two weeks and explore, come back, refuel and then we'll be back out exploring.

Can we look inside or maybe go for a ride? Absolutely. Let's go for a ride. Pilot's on, power's on. Go to low gear. Push forward on the stick. The Planetary Analog Test Site, also known as The Rock Yard, is a multi-acre simulation of lunar and Martian terrain.

It is here that the Space Exploration Vehicle endures rigorous testing to determine its readiness for eventual off-Earth deployment.

Let's go through that crater first. Just go up and over? Yeah. Can it handle that kind of a maneuver? Yeah, if you put your foot right up there—that'll brace you in your seat. So, like, on a tank, you would typically feel it tip over. So, active suspension, each one of the wheel modules, it senses it. How about that? It's all right to ride across these? Yeah, drive over across anything. When it sees a big rock like that, it just goes right over it? Yeah, it just goes right over it.

If ancient astronaut theorists are correct, and extraterrestrials came to our planet thousands of years ago in search of gold and other precious minerals, wouldn't there be evidence? Some telltale sign that the Earth was once the site of a vast, global mining operation? There was a place in Peru called Cajamarquilla, and at this spot there are thousands of shallow pits that are going up the ridge of a mountain, and they're in-line.

They're quite uniform. They are only say, two, three feet deep, these pits. And they are baffling. What these pits might actually be is the result of some kind of mining probe that was going up this mountain, digging these holes, and then sampling for valuable minerals. Today, Cajamarquilla is mined for zinc, a mineral used in metal alloys and electrical equipment.

But if Earth may have provided a treasure trove of raw materials for extraterrestrial space travelers, what resources would Mars have to offer? Recent NASA findings suggest the Red Planet could be capable of supporting human life, and in ways never before imagined. After decades of searching, scientists believe they have recently found something incredible on Mars: water.

On July 25, 2018, the European Space Agency's Mars Express spacecraft reported the discovery of a subglacial lake located a mile or so beneath the planet's otherwise arid surface. If confirmed, it would be the most significant evidence yet that Mars either did or perhaps still does provide a habitat for living organisms.

We know that evidence for life occurs almost as soon as you have a liquid water environment on Earth. We could anticipate that, you know, there

would be scenarios where people could have seeded the Earth with life so that life would develop very similarly on Mars.

The existence of water on Mars would also be of huge benefit to colonization efforts. And while scientists are still confirming the presence of this subglacial lake, they are now certain that in the distant past, the Red Planet was once blue, and boasting a more robust atmosphere. One of the most fantastic things that we've discovered with our orbiters and our rovers on Mars is about its history. And a number of really spectacular surprises have come out.

The first one is that Mars, at one time in its past, looked more like the Earth. It was a blue ocean world, with a significant amount of water. We know for a fact that billions of years ago, when we were first getting started here on Earth, then Mars was a much more clement place. We know that it had a thick atmosphere to shield and blanket the planet. And it would have had organic molecules, the building blocks of all life as we know it.

So it stands to reason that maybe Mars had its own genesis, its own origin of life. Was Mars a fertile planet, teaming with life, thousands or perhaps millions of years ago? And if so, could the planet be modified in such a way that it could sustain human life? It is NASA's stated goal to send astronauts to Mars in the 2030s.

But while humanity's efforts to colonize space are well underway, there is still a tremendous amount of planning and scientific groundwork to be done before we can truly begin to populate alien planets with large numbers of humans. Right now, we're basically just tourists in space. We take everything we need with us. And in order to make the next giant leap, you're going to actually have to start using the materials that you find in space to help you explore.

As soon as you make that step to use the materials that are available to you on the surface, now you're truly a pioneer. There's a number of resources that are already available to us. And then, of course, we're going to want to start planting things. We're going to have to grow food. We're going to have to live off the land the best we can.

Live off the land? On Mars? According to NASA, innovations in technology will be able to make the Martian landscape more hospitable to humans than was previously believed. But could this same adjustment to a planet's environment be similar to what extraterrestrials could have accomplished here on Earth centuries ago? Ancient astronaut theorists say yes, and sug-

gest that stories from nearly every ancient culture prove this audacious notion to be true. One of the strangest traditions in South America is with the Kayapo people in Brazil. And they have this legend of the Bep-Kororoti, who came down from the sky in a lot of noise and wind, and landed his craft.

He then taught the people knowledge of civilization, of herbs and medicine, of building and agriculture and crops. And today, the Kayapo people celebrate him every year, and a priest dresses up in this outlandish outfit that looks like a spacesuit. So you have to wonder, where are they getting these ideas of people in spacesuits if not from some extraterrestrials who landed there in the distant past? Today we are on the verge of going to other planets and seeding them with life. And it makes complete sense that something like that happened on our planet in the very distant past.

At Johnson Space Center in Houston, Texas, NASA exploration mission scientist Dr. Elizabeth Rampe introduces Travis Taylor to John Gruener, a space scientist with NASA's Astromaterials Research and Exploration Science Division. Gruener is working to determine what humans will be able to grow and eat on Mars, so that they can live off the planet's resources. So what is this? It's weathered volcanic ash, or tephra. And it's very similar to what's on Mars. Everybody thinks of Hawaii as this paradise, right? Warm beaches, right?

You get up on top of these volcanoes, and it's cold, it's dry. And so we've been using this for a number of decades. It's kind of our general-purpose Mars simulant. We've tried growing plants in it. Well, have you been able to grow plants in it?

Sure. Because people grow in volcanic soil all over the Earth. It's full of minerals, all right? But what we're lacking on Mars are those biological things. Well, at least we think we are, right? At least we think.

Maybe not. We're finding this methane. Well, will we need some other things, like bacteria or something that you have to mix into the soil before seeds will germinate and grow? Yes, because those roots in the soil don't just suck up the minerals by themselves. And, of course, that makes the planetary protection people go crazy, because we want to bring bacteria and fungi and microbes to Mars, and, of course, we're trying to understand—If they're already there—if they're already there or if there ever was. So I have a theory about that.

And I believe that we've already contaminated the rest of the solar system the way Mars has contaminated Earth with its organic material. Because

we've had major meteor impacts on Earth, and it's likely that an impact meteorite that's ejected from Earth with enough escape velocity to achieve an orbit that would bring it to Mars. And absolutely, if a comet had impacted Mars and Earth, we all have the same stuff, so I think whatever we find here, we're likely to find there, and vice versa. And so this stuff's just sitting there, waiting for us to use it.

If many of the minerals that exist on Earth already exist on Mars, is it possible that not only did the planet once support life, but that it does so even today? There are scientists who believe the answer is yes, and they are even willing to go one step further. They suggest we might be able to use sophisticated terraforming technology to transform the Mars environment so that it more closely resembles that of Earth.

When we go off Earth, whether it's to the Moon, to Mars, ultimately we have a choice. We either evolve ourselves to meet that environment, or we turn that environment to an Earth-like environment. As we have evolved on the planet, so has the biosphere. And indeed, that's what will happen on Mars. We'll be using the resources there and changing that environment.

It's fascinating that right now there are active talks by scientists who are proposing the terraforming of Mars. It means that we know that Mars is a great candidate to, over time, develop a similar atmosphere like here on Earth. Which is incredible, because a planet that can sustain life is a rare thing in the billions and billions of celestial bodies that we have in the universe.

When the first Earth pioneers arrive on Mars, what will they discover? A barren world devoid of life? Or will they confront a profound reality, one in which they encounter evidence of an advanced alien civilization which once existed thousands of years ago? As scientists face the enormous challenge of colonizing space, it is widely believed that robots equipped with artificial intelligence will play a critical role.

Even now, AI technology has been used to find alien planets, classify galaxies and even create spacecraft capable of dodging space debris. Robotic probes, like NASA's Cassini, for example, explored space for nearly 20 years and was instrumental in the study of Saturn and its rings. We always send robots out ahead of the humans to find out a lot of those unknown things, like the radiation which is so hazardous to us.

When we get there, rather than astronauts going out in spacesuits by themselves, it's going to be astronauts and robots going out and exploring

together. Most experts agree that before travel into deep space can take place, artificially intelligent robots will need to be able to harvest mineral resources to keep operating. A version of this idea was first proposed by Hungarian scientist and mathematician John von Neumann in the 1960s. He came up with the idea of a self- replicating robotic probe that could be built and rebuilt from materials found on asteroids. Von Neumann envisioned the idea of self-replicating automatons using asteroidal rubble as source material.

Machines could be sent to another planet, and it would start making copies of itself, and perhaps evolve from just the original copy to something more complex. From one probe, you get a thousand, then a million, then a billion, and a trillion. And pretty soon you have a sphere of trillions of probes colonizing the galaxy at near the speed of light.

NASA has proposed the idea of self-replicating automata to be sent out to the asteroid belt, which is a place rich in minerals and materials that are easy to get to because they have low gravity. You don't land on an asteroid, you dock with it. Is it possible that we are looking at, in the future, such self-replicating automata building spaceships out of asteroids, going different places, doing exploration for us? It's quite conceivable.

But if intelligent space robots are mankind's best hope for exploring the galaxy, is it possible that Earth was visited by extraterrestrial robots hundreds, and perhaps even thousands, of years ago? If so, are we likely to encounter them again? If we go to other planets, we would first send mechanical probes down to evaluate the climate and the minerals and the temperature and everything.

You would think that extraterrestrials would do the same for our planet. When you think about it, it's got to be one of the most fundamental things that they would do first. Sending out intelligent robotic systems to probe. They're expendable, and you can send them everywhere. And perhaps we should be looking for those systems first as aliens.

According to ancient astronaut theorists, evidence that extraterrestrials sent robots to Earth can be found in the stories of ancient cultures. In the story of the Argonauts—that's an old Greek myth—we for the first time hear about Talos. Talos was—today we would call it a kind of robot. Talos was always surrounding the island of Crete. And whenever someone came close to the island of Crete, he shut it down. Except they had a certain code with which he did not shoot anymore. So for us, Talos was like a robot.

An important figure in early Greek mythology was Cadmus, a divine character, the first hero, fifth in the lineage from Zeus of the Greek gods. It was Cadmus that started agriculture, who brought civilization, and he brought the making of bronze. He knew how to make alloys, special metals, which, in the early days of civilization, was the beginning of technology. He was a slayer of monsters. And he killed a water dragon, and he took the dragon's teeth and planted them like seeds, and great, fierce warriors grew out of the process.

We have to wonder if a lot of this is, again, depicting machines being powered by some type of extraterrestrial energy. When you look at the planet, you try to hypothesize what came here, in terms of extraterrestrials, and what came here first. Look at what we do to Mars. We send little rovers all over the place, electronic things.

Did they do that to Planet Earth, too? Or did they come here directly and then come down with occupants? I think what probably happened was the craft came to the planet, and then they sent down robots or androids to explore the planet. During his visit to the Johnson Space Center, aerospace engineer Dr. Travis Taylor visited NASA's Robotics Lab, where he was shown the latest in space-faring robots. So this is the robotics lab? Well, this is the Dexterous Robotics Lab, and this is Robonaut. A lot of our future exploration concepts have us sending our assets, sending our spacecraft, sending the food and logistics first, and making sure everything's set up, and then sending our crew members. So it's possible that the robots could actually build our habitats and things before we got there. That's the thought. And what if you needed to make repairs on the outside of the ship? Could Robonaut do stuff like that instead of you having to go out and do that? Absolutely. Robots are great for the dull, dirty, dangerous, and the crew members inside the spacecraft could basically be directing the robot, commanding everything about it.

Robonaut looks very human. Why make it look human? It doesn't have to have a head. You could put the sensors anywhere. However, since we were trying to make it for a human environment, and to work with humans, we thought that, well, form should follow function. So, it's an engineering decision, but it's also kind of a good human-interaction decision, too.

We've had one on board the International Space Station for many years. And we always, always get the crew request to say, "Hey, can I tweet this really cool photo that I took of me and Robonaut, and we're doing Tae Bo together?" So, it tends to promote bonding a little bit more. There's some-

thing we could learn from that.

If we ever were to, say, go to another star system, and we found a culture that were not bipedal, we might want to send our AI, if they were quadrupeds, we might want to make a quadrupedal robot. I mean, people put faces on everything, right? You'd want to do the same thing for an alien culture, if you could. And what kind of AI, or whatever, runs its systems? We have sound on board. So, we do a lot of vision processing, and we have used neural nets.

We're working right now to connect the Robonaut to the spacecraft. So, have a smart spacecraft that knows what's going on within its walls and be able to say, "Hey, Robonaut, I need you to go and change this filter out."

Well, the other thing that jumps out at me is, of course, the negative scenario, where they can become smart enough, and they want to take over. Is mankind following in the footsteps of its alien ancestors by using humanoid robots in the exploration and colonization of other worlds? Ancient astronaut theorists say yes. But how will mankind fulfill its own extraterrestrial destiny if only robots are able to function on other planets? For many, the answer is simple. Surviving on Mars will require not only new technology, but a new breed of humans.

All right, you want to go to Mars? Sure, let's go to Mars. At the Johnson Space Center in Houston, Texas, aerospace engineer Dr. Travis Taylor meets with Paul Valle, the project manager for the Active Response Gravity Offload System, otherwise known as "ARGOS." Travis is eager to experience firsthand how space colonists will be trained in order to survive in reduced-gravity environments. And now you are on Mars. I can jump oh a lot higher. So, if I were going to try and walk across Mars I might have soime difficulty remaining upright. The ARGOS simulator is amazing in giving me some insight in realizing it's not easy to work on a planet that isn't the planet I came from. If I was on Mars or the Moon or anywhere else, I would have to completely retrain my mind and body for working there. So if any civilizations have done that, they would have had to do the same type of training, or when they got here, they'd be extremely clumsy. Now imagine doing it with a space suit, life support like the Michelin Man. You don't realize how much you use gravity to do everything. You don't realize until it's gone.

Although recent NASA footage of astronauts doing somersaults in mid-air and eating floating M&Ms paints a whimsical picture of what it's like to live in a low- gravity environment, but the lack of gravity can, over time,

have a devastating and profound impact on the human body. What we have to do when we decide to go to Mars is really study all aspects of human physiology, how we're going to operate in a gravity that's much less than the Earth. Our body will change because of that environment. We're doing research in many ways right now, studying the effects of being weightless and then coming back to the Earth.

March 2, 2016. Kazakhstan.

American Astronaut Scott Kelly returns to Earth after a record-setting 360-day mission aboard the International Space Station. The duration of the mission was intended to help researchers understand how prolonged periods of time in zero gravity can affect the human body. Scott's identical twin brother, Mark, also an astronaut, served as a control subject.

Because of his twin's DNA, which is, in theory, identical to his, they could then determine what kind of DNA changes had happened to him. And what they discovered was that about seven percent of his DNA had been altered. Extensive post-mission lab tests confirmed the astonishing changes that had taken place. Genes related to Scott Kelly's immune system, DNA repair, bone formation networks, his bloodstream, and numerous other systems have all been altered. The startling results prompt scientists around the world to ask: what are the implications for humans who leave Earth permanently? So, I did a lot of my early medical work and medical research on how the human body adapts to space as you go up into orbit. So, we are going to begin to speciate and form subspecies of humans as we head off towards the stars.

Perhaps we should genetically modify ourselves to thrive in outer space. We're going to have to modify ourselves to adjust to different atmospheres, cosmic rays, radiation, you name it. Do we want to use gene editing technology to evolve ourselves and modify our DNA, modify our bodies to meet the needs of space as the human race is moving irreversibly off the planet?

February 2017.

Maverick geneticist Dr. George Church, of Harvard University, makes an announcement that sounds like something out of a Hollywood movie.

Using a genome editing tool called CRISPR-Cas9, he and his team have combined DNA from an Asian elephant with genetic material from a species that's been extinct for nearly 4,000 years. With the substitution of 45 sections of the elephant's genome with the DNA of a woolly mammoth, they insist that a creature from ancient times could soon be, once again, walking the Earth.

Once you have the technology to completely decode DNA and recode it, you also have the technology, then, to genetically alter any human being, or any animal or plant. And so, therefore, you're able to genetically engineer a humanoid species that will be better adapted to space travel, better adapted to life on a different planet. Extraterrestrials coming here in the ancient past could easily have done exactly the same thing.

Could extraterrestrials, in possession of this same DNA-altering knowledge, have used it to aid their colonization efforts here on Earth thousands of years ago? An idea which once seemed absurd now seems remarkably and eerily plausible. Could you go back in time and look at something like the prehuman creatures, and genetically modify them and create what has become Homo sapiens? With our technology today, we could pick a near-sentient creature, and start doing genetic modifications on it, and create a new, sentient race.

In addition to genetically modifying the human body in order to make it better suited for space travel and colonization, many experts propose that there will also need to be a merging of man and machine. Genetically modified space colonists, they argue, will have to be fitted with bio-mechatronic parts in order to create a human that is smarter, faster, stronger and more durable.

I've been talking with some scientists, and they say the next thing that's going to be coming is the cyborg evolution of humanity for those that are going to go into space. We have this Hollywood image that the aliens are going to land, and they're going to come out looking somewhat like us.

And they'll say, "Take us to your leader, Earth man." But I think it could be quite different. They could be part robotic. Realize that they could be thousands of years more advanced than us. There is a culture out there that's more advanced than us, that they've already built these robotic bodies.

Why wait for them to come to us? We have to become a huge, spacefaring culture, a civilization to go out and answer these questions for ourselves instead of just sitting on our hands and waiting for them to give us the answer someday. In finding ways to modify the human body, along with developing highly advanced methods for terraforming other planets, is mankind really going "where no one has gone before?" Or are we simply fulfilling our destiny, one that stretches back to the very beginnings of human life here on Earth? As far as ancient astronaut theorists are concerned, the more humans venture into space, the closer they will be to discovering their true

origins. Not on Earth, but on an alien world, far, far away.

December 20, 2013.

Noted ecologist Dr. Ellis Silver publishes his book, Humans are not from Earth. In it, he proposes that humans possess a multitude of physical vulnerabilities, such as slower childhood development, a heightened susceptibility to illness, spinal problems and difficulty giving birth. He concludes that they most likely evolved on another planet. There are a lot of indications that mankind, the human race, actually did not evolve on the planet Earth.

For one thing, you know, if we go out in the sun too long, we get sunburned. And that doesn't make a lot of sense unless the conditions on Planet Earth have changed very dramatically in the last few thousand years. You have to wear sunglasses outdoors. That also indicates that our eyes are not properly adapted to the planet. Some recent studies in sports medicine have shown us that the human body creates two types of fat. One isn't a good type of fat, and the other one is. And interestingly enough, the studies show that if you bring the temperature down to about 67 degrees Fahrenheit, you create the good fat and not the bad fat. Near the equator on Mars in the summertime, it's about 67 degrees Fahrenheit.

Now, that's Mars today, with very little atmosphere. Imagine, in the past where Mars had an atmosphere, the average temperature on the surface might be around 67 degrees.

Another factor is that when astronauts actually go into space, their circadian rhythms, their body clocks, change from 24-hour days to a 24.9-hour day, and that happens to be the exact rotational period of a single day on the planet Mars. Given the fact that our body clocks are tuned to the planet Mars, not to the planet Earth, that indicates to me that we actually came here from there. Some have suggested that at some point, Mars had an atmosphere, and due to some cataclysmic events on Mars, the Martians had to find a new home within our solar system. And they came to Earth.

So what if we are the Martians? Could it be that the human race actually evolved on Mars? And if so, what might have caused our ancient ancestors to come to Earth so many years ago? At some point, billions of years ago, Mars suffered a kind of environmental catastrophe. Its atmosphere started bleeding away into outer space because it had no magnetic field to help shield the planet.

In 1976, author and researcher Zecharia Sitchin proposed that a 12th planet once existed in our solar system just beyond Mars that was somehow

destroyed. Although his declaration was based on his study of ancient Sumerian texts, it was largely dismissed by the academic community, who thought the idea absurd. But recent physical evidence has come to light that may prove Sitchin more correct than even he believed possible.

October 7, 2008.

An 80-ton asteroid enters the Earth's atmosphere and explodes 23 miles above the Nubian Desert in Sudan. That day, an estimated 600 meteorites literally showered the landscape. But when examined, the meteorites were found to contain something incredible: diamonds. They also contained something else: evidence that they came from what scientists now believe to have been a lost planet in our solar system, one which was destroyed thousands of years ago.

The asteroid belt in our solar system is a strange thing. And some have suggested that these are the remnants of a planet that exploded at some point. And the inhabitants of that planet either went to Mars or they came to Earth.

I am convinced that the reason why there's such a huge fascination with space travel is because that's where we come from. If there really were an additional planet in our solar system that was destroyed by a cosmic collision, as Zecharia Sitchin suggested, could its displacement have had a calamitous effect on other, nearby planets, perhaps Mars? And how would the ancient Sumerians have known about it? Between Mars and Jupiter today, we have the asteroid belt, and the asteroid belt, in my opinion, was once a planet which exploded because there was a war. There was a war in space, a war in heaven.

Many mythologies speak about this war in heaven, including our Christian religion, where they speak that the archangel Lucifer fought against the archangel Michael. Greek mythology, every mythology around the world begins with the war in space, the war in heaven.

In my opinion, Mars was inhabited. Could the human race actually be populated by the descendants of refugees from Mars? And could this be the basis not only for our longstanding fascination with the so-called Red Planet, but why we are so compelled to return there?

June 20, 2018.

The White House Office of Science and Technology releases an 18-page report. It outlines what NASA and FEMA, the Federal Emergency Management Agency, must do in the next decade to prevent deadly asteroids from

crashing into Earth.

The document covers everything from earlier detection and possible deflection to ways of dealing with the fallout from a catastrophic impact. We have a lot of these small bodies, these things that are coming out of the asteroid belt, these rocky meteors that impact the Earth. So over the last 15 years, we've studied how many are there, how many cross our orbit and we find that there are some really big ones. They are going to hit the Earth. It's not a matter of if, it's only a matter of when.

We get a single hit from an asteroid that's as big as the one that took out the dinosaurs and, that by the way, is a 100% probability that that is going to happen, sooner or later. When that happens, all human life on Earth comes to a halt and we go extinct. All of our proverbial eggs are in this one basket.

If anything happens to us, if there is an asteroid incident, if there is a human disaster created, every element of our culture can get wiped out instantly. In recent years, more and more experts have come forward to stress the importance of establishing human settlements off Earth in order to insure the continuation of the species. But is humankind still many years away from having the capability to realize this ambitious goal? Or could efforts to colonize Mars be much further along than the government is willing to reveal?

Boulder, Colorado, August 8, 2018.

Tech Titan and SpaceX founder Elon Musk convenes a secret meeting of high- level scientists, engineers and space colonization experts. The 60 attendees are warned not to publicize anything about the meeting or even acknowledge their participation. But news of the meeting leaks, sparking widespread speculation.

Why such secrecy from its organizer, a man who rarely shies away from the spotlight? Some have suggested there could be a connection to an event that happened seven weeks earlier—President Donald Trump's call for the establishment of a new branch of the U. S. military, the Space Force.

So, recently, President Trump announced a Space Force. Basically, what he's saying is, we are going to develop an outer space initiative, a deep space program that's going to be started from the military, controlled by the military and apparently will have militaristic aims. Now, some people may find this alarming, but others may look at it and say, what's really happening here is a very, very crucial moment in human history and in the history of the United States, where we are stepping into space in a real, real serious

way.

In relation to the space program, the private sector players, the billionaires, the Elon Musks, they're increasingly the people making the decisions on this. It's almost as if government is losing control of it. Or it might be now wholly in the private sector. Maybe being deliberately moved. It is, I think, sometimes more difficult for people to find out what's going on in the private sector than actually what's going on in government.

I had an interview once with an astronaut about the fact that if we don't get ourselves, get some contingency of humans off soon, on the Moon, some on Mars and going beyond that eventually, homo sapiens sapiens, as a species, if confined only to Earth, might face an existential crisis. We deserve to know the truth, that there is alien intelligence, and our government knows about it in great detail. And now we're finally at the intersection, in time, where that has to break out if we're going to grow and go beyond Earth and start moving out into our own solar system.

Is it possible that there are people within the United States government who already know that the first astronauts to land on Mars will encounter intelligent extraterrestrial life? And are they secretly working with billionaires in order to help carry out preparations for this inevitability outside of the public eye? As far as ancient astronaut theorists are concerned, whatever the government does or does not know, as we begin to migrate off Earth, all of humanity will soon learn the truth: that we are not alone in the universe. I think what we're very near is an event, a discovery.

Could be on the moon, could be Mars, could be maybe Proxima Centauri or any of our local stars, where we're going to understand that everything that ancient astronaut theorists have been talking about is true. We human beings, we fancy ourselves as being pioneers and wanting to be the first. And that's wonderful. We are pioneers. We are the first on many, many things. But what if we arrive on Mars, we actually land there, and there are artificial structures? It's just the closing of a gigantic circle. Is it possible that ancient stories, involving everything from angels and gods descending to the Earth to miracles and extraordinary extraterrestrial events, were handed down from generation to generation in order to prepare mankind for interplanetary exploration? Ancient astronaut theorists not only believe the answer is yes, but they also point to a recent scientific discovery that may indicate we are rapidly approaching an exodus from Planet Earth.

The University of Tennessee.

Forensic anthropologists examining human skulls dating from the mid-1800s to the mid-1980s find that, in the past 100 years, human skulls have become larger, taller and narrower. Although exactly why these changes have occurred is still being debated, many scientists believe that even more rapid changes will take place when future humans spend more and more of their lives living in outer space. According to them, the human head will continue to grow wider as brain mass increases.

Decreased access to sunlight could lead to the development of larger eyes. And nostrils might elongate, in order to facilitate breathing in dusty environments, like that of Mars. Scientists have suggested that if beings like us were to go into space and spend long periods in space, without normal gravity and such, that our muscles would begin to atrophy, we would have much longer, spindly arms. And this is how, sometimes, extraterrestrials are described as well.

If I say that, somehow or other, life on Earth came from an extraterrestrial source, your first thought is immediately: ooh, little green men or little grey aliens with big bug eyes or whatever did that. But it's an interesting parallel when you hear people talk about humans' evolution. Is it possible that that's what humanity might become for spacefaring purposes, is more like these grey aliens? One theory that's been proposed, that these are actually ancestors of humanity that left Planet Earth at some point, and over millions and millions of years have evolved into this more spindly-limbed, more neuro-focused, night vision-focused creature, but actually are tied to humanity's past.

Some have suggested that the ancient astronauts our ancestors encountered perhaps were us human beings from the future going back in time to teach us. That's an interesting idea, because I think that time travel is conceivably possible. However, with the ancient texts that I'm familiar with, I have yet to come across a passage that one of these "gods" says to our ancestors, "We're the same, but we are from the future."

While ancient astronaut theorists are divided on the question of whether extraterrestrials, like the so-called Greys, are, in fact, biologically evolved humans visiting us from the future, what they all agree on is that the day is fast approaching when we will finally know the truth about mankind's alien origins. In creation mythologies, there's a plan that emerges, and this plan is for people to become more like the gods, so that we could be reunited

with them in the stars. We are on the cusp of, or perhaps even in the middle of, this tremendous transformation that will connect us with extraterrestrial beings.

A Gallup poll was done to ask questions of the population that would indicate whether or not they had had interactions with biological entities that were not human. And that Gallup poll came to the conclusion that three to four percent of the current population of our planet have had an interaction with something that's in the nonhuman category. So are the nonhumans waiting for a specific moment in which they will say the human experiment is beginning to grow up? We want to go out and explore. And we think it's the beginning.

It's not the beginning.

I don't think it's coincidental that at this moment we are recording mass sightings of extraterrestrial craft. We're understanding the ancient world and how they interacted with extraterrestrials. Science is advancing to understand this. Communications are being put in place. I think all of this is leading to this moment where we're going to peak, where we're going to experience this disclosure, this convergence, this return, and it will forever change humanity.

Will humankind succeed in establishing new colonies on other planets? And if we do, will we discover that we are not the pinnacle of creation, but just the newest members of an intergalactic society? Perhaps as we transition off of Earth and out into the stars, we will find that we are not reaching the peak of our human evolution, but only the beginning of a destiny that's as limitless as the universe.

3. Destination Mars

Do I believe that there is or was life on Mars? Yes, I'm absolutely certain of it. There are a lot of different objects on Mars that look exactly like sculptures that human beings make. We have to ask ourselves what civilization built this? And what happened to them? There's no natural phenomenon that can account for the nuclear data recovered from Mars. That is weapon signature.

Going to Mars, it's something we know somewhere in the back of our brains that we have to do or we die. Since the dawn of civilization, mankind has credited its origins to gods and other visitors from the stars. Did extraterrestrial beings really help to shape our history? And if so, might we find the truth when humans land on Mars?

MAN: We are go for launch.

MAN 2: Roger, go for launch.

MAN: Five, four, three, two, one. We have ignition.

We have lift off.

Earth, 2026.

Four civilian astronauts begin their 150-day journey to the Red Planet.

MAN: Velocity 14,899 miles per hour.

The voyage will take them deeper into space than any human has ever traveled— over 128 million miles; one hundred times greater than the distance to the moon.

You leave Earth at a pretty high velocity, and the spacecraft flies away from the Earth and away from the moon and away from the sun. The distance away may not be the biggest concern. And it only takes five months to get there. Now, you can certainly withstand that. So the problem is getting back.

They're traveling so fast that they can go through ten feet of solid steel. So a rocket has to be built so that it's very, very well shielded for human

beings. It's not an easy trip. And there are momentous catastrophes that could occur. I kind of like to compare that to when the first explorers were going across the ocean. Those were long, horrible journeys as well and we survived those. And I really see Mars as one of the great, first stepping stones to exploring space.

I was born with a fascination for space. And the only thing I wanted to do was explore. I wanted to know what was out there, and get out there. And so, by the time I heard about Mars One, it felt like there was a calling, a destiny there. What an amazing way to kind of give your life to the greater cause of humanity. We are a species of explorers. And the reason why we keep looking out there, in my opinion, is because that's where we came from.

You will not find any other organism on Earth that has such a fascination with space, with the stars or with anything that displays such curiosity like human beings. And our next step will be colonizing Mars. So the idea that others have proposed that we are nothing else but the Martians, so we are bound to go there.

According to NASA, the colonization of Mars will begin not with humans, but with robots sent ahead to construct habitats, rovers and life-support units. Food and supplies will be sent next, and then finally the first humans will arrive, ready to start their new lives as Martians.

The Martian environment is very different from Earth. It has 38% of the gravity of Earth. The daily temperature fluctuations are very extreme. For instance, if you're near the equator on a summer day, it can be as warm as 70 degrees Fahrenheit. But at night, the temperatures could drop down to minus 100 degrees Fahrenheit. So there's a lot of things out there that's going to kill us, including radiation, and the dust storms.

The atmosphere is incredibly thin—about one percent of that of Earth. There's no breathable oxygen there. The radiation is very high as well. And so astronauts there are faced with multiple difficulties. A Martian day is almost like Earth's. It's 24 hours and 39 minutes. So it's just a little bit longer than a day on Earth. But a Martian year is two years, because Mars' orbit is twice the size of Earth's.

Because of the day-night cycle and the thin atmosphere, Mars is the only nearby planet where large-scale greenhouses lit by natural sunlight can be utilized. These structures will allow the colonizers to grow their own food on the cold and barren planet. Obviously you can't rely on food parcels from

home coming every two years. You're going to have to grow your own food. A lot of people think, "Well, that's pretty straightforward. You just take a few potatoes and cabbages, and away you go. You can do farming on Mars."

Now, research that's been done at Arizona State University suggests that when you send microorganisms into space, they behave differently. They don't like it up there.

Hundreds, if not thousands, of PhD theses in the last 20 years have been written about how to grow food on Mars. And there was a very interesting experiment done a couple of years ago in Holland, where NASA provided the Dutch with what they thought was almost an identical copy of the soil on Mars. And the Dutch planted of all kinds of different vegetables. And every single seed germinated. Some things did better than others— like carrots grew very well there. There is no question that we will be able to grow food on Mars.

But it's going to be hundreds of years before we grow enough food on Mars that we can survive from the food we grow. The only way we're going to be able to do that is to terraform the planet, so that it becomes much more Earth-like so that we can grow crops on the surface of the planet. In recent years, scientists have proposed various methods to terraform Mars, deliberately altering it to be more Earth-like. Most focus on melting the ice at the poles to release carbon dioxide into the atmosphere to thicken it. If we heat up the poles on Mars, that causes a significant temperature rise on Mars, and we start having flowing water on Mars, especially around the equator. Then water itself will go into the atmosphere, which is another greenhouse gas.

And we will warm up Mars. And we will be able to plant crops on the surface of Mars. But that's years away. That's probably at least 200 years in the future. With missions from both NASA and the private sector now officially in the works, humans landing on Mars is no longer the stuff of science fiction. But will we really go so far as to terraform the planet so that we can establish permanent residency there? And if so, why? What is it about Mars that compels us to go there? Interestingly, the conditions on Earth three to four billion years ago are thought to be much different from what they are today.

Like Mars, the planet was relatively uninhabitable and lacked an atmosphere. According to ancient astronaut theorists, directed terraforming may have been exactly how life was started on Earth. And as evidence, they point

to our earliest creation stories. When we look at the world's creation myths, one of the things that we find throughout these stories is the idea that the gods sought to create a stable environment on the Earth. The story of Genesis could be seen as a step-by-step guide for terraforming the Earth.

On day one, God or the gods created the universe. On day two, the gods created the firmament. This is described as a dome, or a boundary separating heaven and Earth. Followed by the appearance of plants and animals and later human beings. To me, when I look at Genesis, it is exactly the thought of an extraterrestrial visitation.

I'm sure there's a god— there's no doubt about that—there's a higher power. But somewhere along the line, extraterrestrials came down to this planet, created us, maybe even terraformed the planet, so that it could be adaptable to life. Heck, we're talking about doing that on Mars right now.

The things that we'll be doing on Mars may be exactly the same things that extraterrestrials did when they came to our planet. We'll be terraforming that planet. Creating a more conducive atmosphere. Melting icecaps to create rivers and lakes. And then perhaps even genetically manipulating organisms to better survive on that planet. And perhaps mankind is being guided by extraterrestrials to go to Mars and colonize that Red Planet. With our plans to colonize Mars, are humans actually following in the footsteps of extraterrestrials that came to Earth in the remote past? Ancient astronaut theorists suggest that not only is this the case, but that there is even evidence these alien visitors might have come here from the very planet that is now our destination.

On March 10, 2006, the Mars Reconnaissance Orbiter reached its destination, and began orbiting 186 miles above the Martian surface. It has circled the planet and transmitted over 264 terabytes of data and 200,000 images back to researchers on Earth. On September 28, 2015, NASA scientists announced that the images received from the Orbiter had finally led to the kind of groundbreaking discovery they were hoping for— evidence of water on Mars. Photographs taken by the Orbiter reveal streaks that appear to ebb and flow through the year, much like the seasonal flow of rivers on Earth.

Astrobiologists have had a wake-up call. If there is flowing underground water on Mars, and since we know that all the chemicals structures on Mars for life are the same as they are on Earth, it's unlikely that there is not life on Mars. The big question everybody wants to know is— is there enough water there for Mars life? And in my view, the answer is yes. You don't have to have

liquid water lying around like a pond in order for microbes to make a living. There are microorganisms on Earth that live in Mars-like conditions. So do I believe that there is or was life on Mars? And I say yes, I'm absolutely certain of it.

In 1996, NASA researchers studying a Martian meteorite found on the Alan Hill ice fields of Antarctica announce a shocking discovery— evidence of past microbial life on Mars. They backed away from this conclusion shortly after it made international headlines. Over a decade later, scientists reexamining the meteorite determine that it does indeed contain organic matter and evidence of bacterial fossils. The evidence for microbial life on early Mars from the meteorites is now very strong. It's almost overwhelming. Not only do some of the Mars meteorites show signs of early life on Mars, almost every one of them does.

While evidence of microbial life in Mars meteorites is groundbreaking, in 2013, geochemist Steven Benner presented findings suggesting these meteorites point to a possibility even more astonishing than the notion that there was once life on Mars. He claims that they may be responsible for seeding life here on Earth. Benner reached this conclusion when he found that particular elements believed to be crucial to the origin of life are not readily available on Earth, and would only have been present on the surface of the Red Planet. I've always felt that Mars was actually a better place than Earth for life to get going.

Now Steve Benner recently has added to the appeal of Mars as the cradle of life by pointing out that certain elements that are actually essential for organic chemistry to work properly, like boron and molybdenum, are more abundant on Mars than they are on Earth. We can imagine that life on Earth started on Mars, so in a sense we're all Martians or descended from Martians.

Life on Earth seeded from Mars? Could we, in fact, be Martians? Ancient astronaut theorists say yes, and suggest that this seeding of Earth may even have been a directed effort orchestrated by humanlike beings that existed on the Red Planet. And they claim these extraterrestrial ancestors can be found in the apocryphal texts of the Hebrew bible, represented as the "fallen angels."

We know from ancient legend of the books of Enoch, that there was a group of angels who descended to Earth in violation of divine law. They introduced to humanity ways, means, knowledge, which we would under-

stand today as science and technology. These angels were in human form. They were called, in Hebrew, Ishim, which means men. They looked just like us. The fallen angels were giants. They were at least ten feet tall, very striking to look at. Enormous eyes. And no wings.

For over 100 years, mythologists have been contemplating this idea that the fallen angels came from Mars to Earth. Even Dante described this in the Paradiso. He called this the fifth level of heaven. Is it possible that the fallen angels came to Earth from Mars? Could we reinterpret the story of fallen angels as beings not from heaven, but from Mars? Based on examination of the astronauts living in the International Space Station, scientists have speculated on what physiological changes might be seen in future generations of humans born on Mars. And ancient astronaut theorists suggest the resemblance to the description of fallen angels may be uncanny.

One of the most amazing things about the human body is its ability to adapt. And if you look at astronauts who go into space, they actually grow about two or three inches. And when you have a human that's born on Mars, what's going to happen is the environment will change the structure of the human body. And what you're going to see in a few generations is humans that are taller and skinnier, because the gravity on Mars is less than that of Earth. If humans evolve long enough on the planet Mars, they could grow to be taller, they'd have the bigger heads; they'd have the spindly limbs.

They might actually grow slightly larger eyes that were equipped to see better in the dark, because you simply have less sunlight on Mars than you do on the Earth, because it's farther away from the sun. They could also end up looking like representations of angels and various other godlike beings that we've read about in the Bible and other ancient documents.

These attributes to somebody from a low-gravity planet like Mars or being in space for a long time may well be the attributes that we see of the fallen angels being very tall and spindly and perhaps pale and with large eyes. Something that we might expect to be coming from another planet like Mars.

Might life on Earth really have originated on Mars? And is it possible it was not by chance, but by design? And if so, just what happened to the Martians? Perhaps clues can be found by examining what some say is undeniable evidence of weapons of mass destruction.

Spanning 2,500 miles across the equatorial region of the Red Planet is a colossal gash in the crust. Called the Valles Marineris, it is over four miles

deep, which is four times the depth of the Grand Canyon. And it runs a length equal to the span of the United States from New York to California. The Valles Marineris is one of the biggest trenches on Mars. It was named after one of the Mariner missions in the '70s. It has some very interesting geological features. It's quite huge.

So it's really an interesting challenge to figure out what formed this valley. It is truly immense. And the question is why did these features occur on Mars on such a grand scale? The Grand Canyon is, you know, created by the Colorado River. I don't think the Valles Marineris was created by a river. It's very clear that it hasn't been made by water erosion. The prevailing scientific theory suggests that the gash may be the result of volcanic activity combined with shifts in crustal plates. However, engineer Ralph Juergens argued in his 1974 article, "Of the Moon and Mars," that the geographic features of the Valles Marineris did not show signs of being torn and upended as is typical of volcanic thrusts. But rather, it appeared to be carved out. Juergens proposed that the feature resembled the residual marks left behind by an electrical discharge. According to his theory, the area was zapped by a powerful cosmic thunderbolt, carving out the landscape as it advanced across the surface, blasting material into space. Although NASA scientists dismiss the theory, it has been gaining traction with electrical engineers.

By using two electrodes to create an electrical arc over a sandy surface, they have been able to demonstrate on a small scale how the Valles Marineris could have been carved out by an electric bolt. You don't see this type of thing with a volcano or an earthquake or any other type of natural occurrence. The feature itself resembles many of the electric discharges that we've done. But could a cosmic thunderbolt be responsible for the massive gash across Mars? If so, was it a natural occurrence or an attack? There are some very interesting stories of ancient advanced thunderbolt-like weapons.

For example, in the Norse, Greek, and Vedic traditions, there is a weapon that can destroy entire worlds. In the Vedic text, what is found is called "Vajra." "Vajra" means thunderbolt. And this is a very powerful weapon that God Indra carries. And it was a special weapon that was designed to destroy this giant called Vritra. Vritra represented the dark force. And then he was creating havoc in the universe. So he had to be destroyed. And Indra used this weapon to destroy this giant.

Vajra is this super lightning bolt strike that devastates everything and is the most destructive weapon that the gods have. And if you look on Mars that scar appears to be from some huge electric strike. Perhaps this Vajra

weapon of Indra that is hitting the planet and creating a huge canyon and may be what really changed Mars. It would seem that these weapons are extraterrestrial in nature.

Could the Vajra described in the ancient Vedic texts be a super weapon used against the planet? Ancient astronaut theorists say yes, and suggest there is even evidence of other weapons of mass destruction being detonated on the Red Planet.

In a 2014 paper published in The Journal of Cosmology, physicist Dr. John Brandenburg presented findings indicating that someone or something wiped out life on Mars with massive nuclear explosions. There's an enormous spike in xenon 129 in the Martian atmosphere. Xenon 129 is produced by very violent nuclear reactions. I originally proposed as an explanation that this was a natural nuclear reactor that had gone unstable. However, as I talked to more scientists, they said the xenon spectrum is wrong. That is weapon signature. That is not from any kind of natural nuclear reactor.

The pattern of radiation on the Mars surface indicates that there is a global debris pattern extending from two hot spots of radiation in the north of Mars going all the way around the planet. The regions of the residual radioactivity are covered in glass— the same sort of acid-etched glass that was found at nuclear test sites. It's called trinitite. So thousands of square miles of Mars' surface apparently were turned to glass. Someone apparently dropped two massive nuclear weapons on Mars to explode in midair. There's no natural phenomenon that can account for this nuclear data.

So we must go to Mars. We must find out exactly what happened there. Are there really telltale signs of orchestrated mass destruction on Mars? If so, might some of the survivors have made it to Earth? Perhaps further evidence can be found by examining the landscape of Mars, and its mysterious formations that some say are alien artifacts.

After the Mars Curiosity Rover touched down, it beams its latest high-resolution panoramic photographs of the Mars landscape to Earth. Upon inspection, amateur archaeologists announce a startling discovery— what appears to be an effigy located at the Dingo Gap, resembling a human statue. The find is just one of the dozens of strange earth-like objects sighted in the Rover images— including a sarcophagus, a Buddha statue and even a cross. There are a lot of different objects on Mars that people see, or think they see, in various Rover images. And it's really hard to dismiss them, because they do look exactly like sculptures that human beings make. And even af-

ter a massive cataclysm, like what apparently took place on Mars, you're going to find remnants from a lost civilization that's just leaving behind those last hints that 'we were here'.

Ancient astronaut theorists have considered that there may be artifacts and unnatural structures on Mars since the first images were beamed back from the Mars Viking Mission in 1979. NASA officials claim the perceived likeness of formations on Mars to man-made objects is due to Pareidolia, where the mind perceives a familiar pattern, like seeing shapes in clouds. But some imaging experts are not convinced that it's just a trick of the eye. Joe White has been working in image restoration for 25 years, and claims to have found artifacts on the Martian surface that defy explanation. The Rover images are generally fairly close-up, and it is possible to spot things like statue heads and stone blocks, sometimes with writing and carvings in them. It's such a shame they do so much to destroy these images.

But basically what they do is they resize them down so that the detail's all lost. But because I've worked in photographic restoration, I know how to do it. All I've done with this is actually enhanced the contrast and sharpened it a little bit. The details I noticed first were particularly the eye and nose details on the front of the statue on the left here with a very quite clear mouth structure and what looks like an ear, just here. And you have a long narrow elongated cone head shape to the statue. Now this may well be an elaborate headdress on this statue here, which seems to be broken off. But it's hard to say for sure.

I mean this is a damaged statue, buried up to its chin and there's probably a lot more of it buried just below in the sand. But you can actually see quite clearly it's the sort of thing you would expect to find somewhere like Central or South America. Might there actually be ruins of a lost civilization scattered across the Martian landscape? Ruins that mirror those that exist on our own planet? Ancient Astronaut theorists say yes, and propose that this is one of many artifacts on Mars that seem to have counterparts on our Earth.

Wait until the first colonists arrive and find the bones!

Certain structures on Mars may be completely related to structures here on Earth. On Mars, we have structures that look like pyramids. There are standing stones and Stonehenge-type of structures on Mars. There's also a structure on Mars that looks like a Sphinx. Around Cydonia, there are many, many objects, including an area called "the city," where the so-called face

on Mars is located.

There's a massive pentagonal pyramid. There's a cluster of other pyramidal objects that are nearby. And one of the things that's really interesting about the city is that some people have pointed out that if you take the apex of all of the pyramidal structures there— and there are number of them— that they basically match the layout of the Pleiades. Now, this is something that we've seen here on Earth. We've seen various ancient architectural monuments that are also laid out to reflect the constellation of the Pleiades.

Is it possible that the structures on Mars are real and of artificial origin? That is something where all of science says, "No, impossible." Well, is it really? Water on Mars— impossible, right? No, it has been proven. So we have to ask ourselves what civilization built this? And what happened to them? And some have suggested that they actually escaped Mars and came to Earth to ensure their survival. When we look to these extraordinary structures on Earth, similar to what we're now seeing on Mars, it makes you wonder did our ancient extraterrestrial ancestors teach humans how to build these monuments? And knowing that one day, we would rediscover our roots on Mars and be able to match up what we've done on Earth with what we had already done on Mars.

Might the various structures and artifacts found on the surface of Mars really be evidence of a past Martian civilization? A civilization that was recreated on Earth? If so, why would NASA try to hide this connection? And might there be more that the public isn't being told? The $2.5 billion Mars Curiosity is the most advanced rover yet to explore the Martian terrain. Beyond obtaining high-resolution photographs, as well as soil and air samples, as it travels across the surface of the planet— it is also able to turn the camera on itself, a feature that enables engineers at NASA to diagnose and troubleshoot issues from Earth.

Curiously, 50 solar days into its mission, the rover beamed a mysterious photograph back to Earth showing what appeared to some researchers to be the shadow of a humanlike figure working on the Rover. You could see a person there. And even it seemed that he was not wearing a helmet, but was in some kind of gear and goggles. And it made people speculate that what might be happening on Mars is more than what NASA and also the military space program has said that we can achieve.

NASA knows so much more about Mars than they are telling us. They put pictures out. They allow things to come out. They do not comment on them,

in general, but they just allow people with eyes, who want to see, to look at these things and understand what they are. But they don't say anything about it, because they are constrained by the political realities.

A couple of years go, we got a call from a person named Jackie, who claimed that she was a former NASA employee. And she went on with this profound story about how our rovers had sent back pictures that NASA has suppressed of humans on Mars walking around. And she was very compelling. She seemed to know exactly what she was talking about. There's always been a theory that there's a space program beyond the space program that we know. It's a black ops program. It's the program where trillions of dollars merely disappear, and nobody knows where the money went. And nobody knows what's going on.

A Scottish hacker named Gary McKinnon actually hacked into the NASA database, and discovered a file, which contained a list of what were called non-terrestrial officers— officers in the military that were actually living and working off of the planet Earth.

Now, "non-terrestrial" doesn't necessarily mean "Mars." But it does mean "out in space." And what that indicates is that there is some kind of top-secret space program that exists that the public doesn't know about. Could there really be a secret U. S. military operation on Mars? If so, just how long has it been going on? Some researchers suggest that a feasible plan to get to Mars was conceived well before we even made it to the moon and by the same scientist that got us there.

Wernher Von Braun was a rocket genius, and he was obsessed with going to Mars. He was obsessed with rocketry. And he wrote a book in 1948 called The Mars Project. And it's basically a 91-page manual on how to get to Mars. It has all the computations worked out, all the formulas for what home and transfer orbits you need to use to get to Mars. He actually projected that he could put people on Mars by 1965. Everything he put in that 91-page manual is actually still valid today.

Wernher Von Braun outlined our plan to go to Mars and colonize it. Well, everybody thinks, "Well, we just never did that." There are other people that think we took his playbook and that we indeed did colonize Mars, and that we have a colony of astronauts there right now under his tutelage when he was alive. There's compelling evidence that Von Braun was working secretly with elements of the U.S. government in an attempt to try to make it to Mars.

Is it possible that was done? Do you think it's possible that the government could keep something a secret? Absolutely. Go back to the Manhattan Project. When they developed the nuclear bomb, there was over 150,000 people involved in that program. No one squealed. No one said what they were doing and many of those people were unaware of what they were working on until the bomb itself was detonated.

So Von Braun could've been working on a secret Mars program, and with the same level of secrecy as the Manhattan Project, it still to this day could be highly classified and never released to the public at large. Werner Von Braun's genius is credited with being the reason we ever made it to the moon. Might he also have orchestrated a secret mission to Mars? And if so, what was its purpose?

Torrance, California.

The board members of a private space agency lead by Elon Musk, Space X, announce that the explicit aim of the organization is and always has been to help humanity colonize Mars.

I do think it is important that we as a species, as a civilization, are on a path to become a true space-faring civilization and a multi-planet species. Elon Musk's position is that humans cannot survive indefinitely on Earth, and there are a lot of threats to the continuation of human life on Earth— both from what we're doing to our own planet, but also from things like asteroids. We get a single hit from an asteroid that's as big as the one that took out the dinosaurs—and, by the way, that is a 100% probability that is going to happen, sooner or later. Going to Mars, it's a survival instinct. It's something we know, it's somewhere in the back of our brains that we have to do or we die. I think that's the message of the ruins of Mars is that this can happen to you. And you should think about, as a species, ways to ensure that the human race is not wiped out, because despite our flaws, we're a very noble, powerful, important part of this universe. It's something that will take us back to our very beginnings.

And here we'll be really following in the footsteps of the ancient astronauts, who came to Earth. And ultimately, we will be like them, being the extraterrestrials ourselves and colonizing a foreign planet.

When we colonize Mars, it's a retracing of ancient footsteps. It will be a reconnection and a remembering of where we came from. And it may be that colonizing Mars will be our ultimate salvation. Mars is a very, very logical point, if life on Earth ever should become impossible, that's our next

step where to go if the survival of our species is at the forefront. Because maybe that's where we came from. So maybe we earthlings are the Martians.

Then the question is has this game been going back and forth for hundreds of thousands of years? Is it possible that the colonization of Mars is the key to our continued survival? And if so, have we stood on this precipice before? Could there have been a human presence on Mars thousands of years ago? Perhaps we will discover the truth about our alien ancestors when we become the extraterrestrials on Mars.

4. Aliens and the Red Planet

Nuclear annihilation. This would have been an absolutely devastating event. Mysterious pyramids. There are, apparently, these unusual structures there and evidence of life billions of years ago. Researchers found objects that looked extremely similar to microorganisms here on Earth.

Throughout human history, the planet Mars has captured our imagination. But is it simply because of its striking red color and prominence in the night sky? Or might we have a more profound extraterrestrial connection? NASA knows there is life on Mars, but for some reason, it does not want that information out.

Cape Canaveral, Florida, August 20, 1975.

The United States launches a Titan rocket carrying the Viking spacecraft. Viking is embarking on a of the most prominent sights in the night sky—Mars. If all goes well, in 11 months, the unmanned probe will touch down on the Martian surface and search for evidence of life. Mainstream scientists say Mars is most likely a dead planet because of its incredible temperature swings and high levels of solar radiation. So why is NASA spending a billion dollars to explore it? The night sky is an astounding thing. And to the naked eye, the red planet could be seen with its special color. After all, it's the biggest thing you see up there past the moon.

So it's been a special object of fascination and reverence because religious systems often were associated with the planets and the stars, the sky in general. Speculations abound about what's there; is intelligent life there, are the gods there? That's gone on for a long time. Our dream for life on Mars probably goes back to the ancient times when we were just doing naked eye observation. It's the planet that really stands out, that we now know is very close to Earth in terms of physical conditions.

Even though Venus is much more like Earth in size and gravity, it's a hellhole in the solar system. But Mars is out there within our grasp. Among

the first to record this fiery red ball in the night sky were ancient Egyptian astronomers. In 1534 BC, they placed Mars on humanity's first chart of the Senenmut star map. Two and a half centuries later, the Egyptians painted the planet Mars on the ceiling of the tomb of Seti I.

But while the Egyptians honored Mars, many other ancient cultures feared it because they associated the red planet with death, destruction, and war. According to some anthropologists, this is because the planet glows red like the color of blood spilled on the battlefield. The association of the red planet with the gods of war goes way back. In ancient Babylon, Mars was named after Nergal, the god of fire, death, and destruction, essentially a god of war.

The Greeks named Mars after Ares, their god of war. The Romans, "Mars," that is their god of war. Rome was a warrior culture, so this martial emphasis, all connected to the red planet, is accounting for the great armies that conquered the known world; a very successful story and very much aligned with the planet Mars. In 42 BC, the Roman forces of Augustus waged the Battle of Philippi against Marcus Brutus, as Augustus tried to avenge the assassination of his adopted father, Julius Caesar. Augustus pledged to the god of war, Mars, that if he won this battle, he would build a great temple for him. So he won the battle, became Caesar Augustus, one of the greatest of the Roman emperors, and he created the temple of Mars, and whenever Rome would declare war, the temple doors would be thrown open. It was called the temple to Mars the Avenger.

Famously, we say the "gates of war" nowadays, right? And it was the gates of Mars' temple that were opened or closed depending upon whether there was a war going on. From India to Rome, all of the ancient societies had a reverence for Mars, a great closeness to Mars. Very important in their pantheon, very important in the imagination of the people that some kind of connection with that red planet be maintained. But while many ancient societies felt a bond with Mars, most did not identify it as a planet like Earth.

The ancients thought planets were as uninhabitable as the Sun. They saw them as wandering stars. In fact, the word "planet" means in Greek "wandering star," planeta. You have the fixed stars, the constellations, but then you have these stars wandering about. They seem to follow the sun because they appear to move against the background of the fixed stars the same way the Sun does.

It wasn't until the 17th and 18th centuries, when astronomers finally had

telescopes powerful enough to make out features on the surface of Mars, that we began to imagine life on the red planet as a real possibility. By the 1860s, an Italian astronomer by the name of Angelo Secchi thought he saw straight lines crisscrossing the surface of our little ruddy buddy up there, Mars. And he called them "canali."

The idea was picked up by an American astronomer by the name of Percival Lowell. And Percival Lowell built his own observatory down in Flagstaff, Arizona. He spent a lot of time looking through a telescope at Mars. And he wrote books about this. He was articulate. He was clever and he convinced a lot of the public and some of the scientific establishment that there really was a civilization on Mars busy digging up their planet because they needed to irrigate their crops. But why has Mars fascinated humankind throughout history? Is it simply due to the planet's proximity to Earth and its striking red color in the night sky? Or is it possible as ancient astronaut theorists contend that Mars really was at one time inhabited by intelligent life?

The Cydonia region of Mars, July 20, 1976.

An alien spacecraft sent from Earth touches down on the red planet. After a ten-month journey, Viking I has reached its destination. To NASA scientists, it's a momentous event. For the first time in its history, the United States has a probe on another planet. Viking was the first spacecraft to actually attempt a soft landing on Mars, and give us an actual feel, a taste for what the conditions were on the surface.

We looked out at those pictures of the surface, and they looked so much like the Pacific deserts here, like Death Valley. We all half expected to see a miner and his burro come walking up over the nearest rise. Scientists knew that finding definitive signs of life on Mars was a long shot. But when the Viking lander performed four tests on the Martian soil looking for microbial life, it returned surprising and controversial results.

Dr. Gil Levin designed one of the tests that the Viking probe performed. Microorganisms breathe just like you or I or anything else, and then they give off carbon dioxide. So we got a tiny sample, a thimbleful of the soil, put into a little container. It was monitored for seven days continuously to see if there are any bubbles forming in the tube. Surprisingly, the tests came up positive for life by the criteria that had been approved by NASA. However, the result of another important test one looking for organic matter on the Martian surface was negative. But Dr. Levin says the other test wasn't nearly as sensitive as his experiment. It needed three million bacteria in a thimble-

ful of Martian soil to find signs of life, while Dr. Levin's test only required 30 bacteria. So there was a vast discrepancy in the sensitivity of the two experiments, and I immediately said, "Well, you know, they both could be right. We detected life, but maybe there aren't enough bacteria per unit of soil for the organic analysis instrument to find. But NASA was very cautious, and they opted to say no organic matter. There goes the ball game. No life."

Dr. Levin has fought NASA for almost 40 years on whether the Viking probe found evidence of life on Mars. If he was right about the results of his test, this would be the first proof accepted by mainstream science that life exists outside our planet, but ancient astronaut theorists say an even more profound discovery regarding the red planet has been uncovered right here on Earth—mysterious relics that may reveal an actual visitation of beings from Mars.

Teotihuacan, Mexico.

In 2003, archeologists in this ancient city made a startling discovery. A previously unknown tunnel lies under the Feathered Serpent, one of the most sacred pyramids on the continent. Working underground, scientists methodically explored the debris-filled tunnel using a robotic probe with an infrared scanner. After some 250 feet, they reached a side-cave. The tail end of the tunnel, terminus of the tunnel, was loaded with yellowish metallic-looking orbs, apparently colored clay.

The orbs are very interesting objects. I've never seen anything like them in any kind of other archaeological context. On the inside, they are clay. On the outside, they're coated with some sort of gold flecks, so they look like golden balls. What purpose these golden balls served is unknown, but some archeologists believe the cavern in which they were found was a place of sacred ritual. Like the clay balls, the walls were also covered in gold flecks, so if the cavern was illuminated with a torch during a ceremony, the cavern would have shimmered with a thousand points of light, resembling the cosmos. These beautiful orbs of yellow material strongly suggests that someone was illustrating planets.

We do know that the Mayan calendar is heavily calibrated to the orbital parameters of the planets in our solar system, specifically the inner planets. The red planet's connection to the Mayan calendar is portrayed in The Dresden Codex. This rare book from Mayan antiquity describes the calendar in relation to Mars' movements across the sky.

The Dresden Codex is one of four remaining books that the Maya wrote.

It is, in many regards, an astronomical almanac. There are many different sections of the book that talk about different astronomical phenomena. One of them is the planet Mars. There is an almanac near the end of the book, that breaks up days into ten groups of 78 days equaling 780 days, which is the cyanotic period of Mars, in other words, the time in which it takes Mars to get back to the same place on the horizon from a human perspective. Scholars believe Mars played an important role in the Maya astrology that's described in The Dresden Codex. Above that almanac is a sky band shown with various aspects of celestial symbols we recognize out of hieroglyphs, and hanging off of it is this interesting dragon-like creature is recognized as the face of Mars.

Why did the planet Mars feature so prominently in Maya astronomy? Ancient astronaut theorists suggest the answer may be found in a little-known myth surrounding the story of the feathered serpent god, whose temple sits above the secret tunnel that contains the golden orbs. In the Mayan tradition, their great god, often pictured as a feathered serpent, was said to have been responsible for the death of the god of Mars, flayed him to death. That's stripping off the skin. It's a horrific ritual that was actually done in other ways in that culture, but the idea is death by that means absorbs the power of the enemy.

But the name of their god also is associated with the comets. There are certain drawings that show comets that look like they have feathers coming off the back.

The flames are depicted as feathers. And some scholars believe there's a connection between the look of the flying feathered serpent and these comets. Is it possible that the Mayan myth of the feathered serpent describes an actual event, a cataclysmic comet strike that destroyed the Martian atmosphere? After studying the red planet for decades, mainstream scientists admit it's entirely possible this impact occurred on Mars in the distant past.

If you look at the Martian landscape, it is heavily cratered compared to Earth. Mars is next to the asteroid belt. In fact, in some ways, it defines the inner edge of the asteroid belt. So Mars is constantly being hammered by asteroids relative to earth. You always have the risk, and of course we've seen it here on Earth, of having large asteroids or comets hit the planet and cause tremendous ecological damage.

The most famous example of that is the Chicxulub asteroid that may or may not have been the final nail in the dinosaurs' coffin. And certainly that

could've happened at Mars because it doesn't have a large moon to help shield the planet and possibly deflect asteroids. In his book, Life and Death on Mars, physicist John Brandenburg describes an impact crater in the Lyot region of Mars that's more than 125 miles in diameter. He believes this comet strike may have caused a profound disruption to Mars' planetary system. It's a large double-ring crater. This happened to a planet that only gets half the sunlight of earth and has one quarter of the surface area, so this would have been an absolutely devastating planet climate-changing event. There may have been a very dramatic event where some other leftover piece from the birth of the solar system, some big asteroid, sort of made a close fly-by, sort of a fender-bender collision with Mars and just stripped off a lot of the atmosphere. That's a very popular way to look at what may have gone wrong with Mars.

But if Mars fostered life long ago, before losing its atmosphere, could intelligent life, and perhaps even civilization, have existed and even flourished on the red planet? And if so, where would the inhabitants have gone after the cataclysm? Some say the answers to these questions can be found in the origin story of Earth's first civilization.

Mosul, Iraq.

During an excavation of the Biblical city of Nineveh, a team led by the eminent British archeologist Austen Henry Layard, discovers the ruins of the ancient Assyrian library of Ashurbanipal. Among the priceless relics Layard recovered from the library is a series of cuneiform tablets called the Enuma Elish, also known as "The Seven Tablets of Creation.'' The tablets are, essentially, text in columnar style, no more than eight to ten inches tall, six to seven inches wide, which were made of clay. And while the clay was just in the process of setting, a stylus would be used by a trained scribe to etch the stories of our existence on this planet.

The Seven Tablets of Creation tell a story about a group of gods called the Anunnaki who came from heaven to give birth to the human race, but some ancient astronaut theorists believe the original translations, completed by the scholars of the day, are flawed. The professors' certainly brilliant brains had no idea of space travel, to say nothing of extraterrestrials. So they all, without exception, made the translations in the belief that the stories had to do with the Almighty God.

In the old texts, we have, for example, a word like "heaven." So, for example, Abraham was taken up to heaven and brought back to Earth. So we

should change the word "heaven" into the word "space" so it makes sense. Using what they say is a more accurate translation of this origin myth, ancient astronaut theorists believe the tablets tell a story about the Anunnaki coming from space to colonize both Mars and Earth.

According to some researchers, the Sumerians had a number of myths about Mars, including that the Anunnaki used Mars as a supply base to come here to Earth. And subsequently the Anunnaki then ruled the earth as these extraterrestrial god-kings, while humans began to create the many civilizations on our planet.

And eventually the Anunnaki left to go back to their own planet. Or did they? Is it possible that the Anunnaki gods in our ancient origin stories were actually extraterrestrial beings and that they created the structures that some believe they see on Mars? And if so, did they then journey to Earth? We see multiple references in the cuneiform tablets that are allegedly the records of the Anunnaki. That, in fact, they did originate from Mars, that this is not a dead, isolated, rocky world with nothing on it, but there was life.

But according to the modern translation of Sumerian and Babylonian origin myths, a cataclysmic event occurred on Mars, an event that sounds remarkably similar to ancient Mesoamerican myths about a feathered serpent flaying the red planet. While the Anunnaki were using Mars as a supply base for earth, at some point there was a catastrophe. There was some asteroid or comet strike on Mars.

It ripped the atmosphere from Mars. It changed the climate, and Mars couldn't be used as a habitable space base for the Anunnaki anymore. And so therefore, as we explore Mars more and more, we may find structures, pyramids, ziggurats, even giant statues carved into rock on Mars, which are really relics of the Anunnaki and the time when they occupied that planet.

Some have suggested that Mars may have had an atmosphere, and it got annihilated about 65 million years ago. What some have suggested is that before this annihilation occurred, that that civilization was able to escape to Earth. Now, according to this view, we might, in fact, be the Martians. Some scientists say they've found powerful evidence of this lost civilization. They believe they may have discovered a nuclear signature in the Martian atmosphere that matches Earth's after a nuclear test.

During the height of the Cold War, we were detonating very large hydrogen bombs in the open air, and it produces a lot of a gas called xenon 129. On Mars, we've also found a lot of xenon 129. The only process we know

to produce this xenon 129 is a nuclear explosion. So apparently, a very large nuclear weapon or weapons was detonated on Mars.

If we look at the Sumerian cuneiform tablets there are very clear references to a variety of advanced forms of technology. And it would seem pretty clear that if we were able to get a nuclear bomb, then why couldn't a civilization that was superior to our own have developed the same technology? There is a Sumerian myth concerning the planet Mars having to do with some colossal battle of the gods, so there is elements in mythology that look very much like descriptions of nuclear war. Signs of a possible nuclear blast, myths of a comet flaying the planet and a controversial NASA experiment that may have found life. Could these really be traces of an ancient alien civilization on Mars? And if so, is it possible there are artificial structures buried beneath the surface even to this day?

The Ares Vallis region of Mars, July 4, 1997.

NASA's Pathfinder spacecraft lands on the red planet. The first probe to reach the Martian surface since Viking, Pathfinder will look for signs of water. Since the Viking missions in the 1970s mainstream scientists have come to the conclusion that the planet may have once boasted oceans full of water and complex life.

Billions of years ago, earlier in the history of the solar system, Mars probably looked, in many ways, the way the Earth did. It did build up an atmosphere and oceans. The atmosphere probably would have been equivalent to Earth's atmosphere at that time. Life could well have formed in the oceans.

One day after the Pathfinder touched down, the Sojourner rover began exploring the Martian surface for signs of these ancient life-forms using an X-ray spectrometer and a high-powered camera. What they discovered was, yes, Mars, in certain places, looks like the high desert on Earth. And maybe there are areas which do seem to be dried-out riverbeds. Maybe there's water under the surface.

The thing we've learned from the rovers that's most interesting, I think, is the fact that Mars once had a wet past. And if there was liquid water on the surface of Mars long enough, not just for a couple of weeks, a couple of years, a couple of thousand years, but for millions of years, hundreds of millions of years, maybe something cooked up in that liquid, maybe life. As the Pathfinder rover snapped photographs of the Martian surface, it captured images of something that puzzled some scientists—a mountain range they nicknamed The Twin Peaks.

In his book, Life and Death on Mars, Dr. John Brandenburg says that because Mars has limited volcanic and tectonic activity, it's an open question as to how these mountains were formed. This interesting formation is the tallest thing for hundreds of miles. Most of the volcanic activity on Mars is concentrated in the Tharsis region. How many miles away is that approximately? Oh, it's, like 2,000 miles away, to the west. All right, so, this area is not known for any volcanoes or anything like that? No, no. And because we now know so much more about the climate of Mars than we did 20 years ago, it had an ocean.

It had long periods, apparently, of liquid water flowing on its surface, so all of this causes us to look at everything on Mars with new eyes. And so we have these two interesting objects. They're conjoined. Not only are they the tallest things for 200 miles but they're linked to each other. And this reminds me of what we have found on planet Earth.

Now, there's alignment. And what's interesting, this is the Giza Plateau from Egypt. And it is near Cairo, which, name in Arabic derives from the name in Arabic Al-Qahirah, which means Camp of Mars, Place of Mars. And we also have found out recently that at one time, the Sphinx was covered with red paint. So, imagine we are looking at the Giza complex and the Sphinx. And a million years of erosion has happened.

Wouldn't these things all look kind of rounded and mounded like this? It's conjectural. Now I notice over here, because it's the Giza Plateau, we have the Sphinx. Has something similar been discovered on Mars, specifically around the Twin Peaks area? Well, we have this strange object which is nearby, and we see that from space and also in the picture.

Here is the Sphinx on Earth. Here is the pyramid. Here is this object. And there is what looks like a mound of stuff. Who knows if it is degraded archeology? We must look at everything on Mars now with new eyes. In fact, when the Sphinx was originally found in modern times, it was buried up to its neck in rubble and had to be excavated. So something similar could be going on right here. There could be a much larger structure buried beneath.

Could the Twin Peaks be evidence that an ancient civilization may have once existed on Mars, a civilization whose structures appear to resemble those on Earth? Ancient astronaut theorists say yes, and that evidence for this startling conclusion has been accumulating for four decades.

When Viking orbiters originally started taking pictures of the surface of Mars, they took pictures of very intriguing features on the plain of Cydonia.

MARS: GOING HOME

On July 25, 1976, they took a picture of something that looked for all the world like a human face. The whole thing kind of blew up when a NASA project scientist named Toby Owen put a magnifying glass over a frame number named "35A72," and said, "Hey, look at this." NASA actually held a press conference the next day, where Owen and Gerald Soffen, who was the chief Viking project scientist said, "You know, isn't it peculiar what tricks of light" and shadow can do? The whole thing kind of went away a couple hours later when we took another picture. The problem with that is that a couple hours later, the Viking orbiter was nowhere near Cydonia and it was dark, so there's no way that picture could have ever existed. Some believe they found not only a human face carved into Martian rock, but also a pyramid, a cliff. In fact, an entire city buried by thousands of years of sand and soil.

By the late 1980s, one researcher had even discovered what he thought were mathematical relationships among the features of Cydonia. A cartographer and satellite imagery expert from the Defense Mapping Agency named Erol Torun took a look at the pyramid and concluded that it was what he called the Rosetta Stone of Mars. He found a bunch of mathematical relationships that pointed to other objects in the area that he thought were artificial-looking. They included the face, an object called the cliff, which is a straight line that goes on for hundreds of meters, a rounded mound called the tholos which appears to have a pathway that goes up to the top.

More than 20 years after the Viking mission, NASA rephotographed the Cydonia region in 1998 and again in 2001. The face no longer looked human, but some scientists believe that was because of when and how NASA took the newer pictures. They shot it from the side. They shot it at morning. It was as much a different viewing geometry and lighting geometry as possible from the original pictures.

Based on that evidence, the face on Mars, evidence of past climate on Mars, a past ocean, I have concluded that Mars was apparently the home of a civilization in the past. Is it possible that an alien civilization existed on Mars in the distant past, and built the structures that recent Martian probes have photographed? If so, does the government know more than it's telling us about life and death on the red planet?

Washington, D. C., August 7, 1996.

On the South Lawn of the White House, 30 years after NASA announced the Viking mission had not found evidence of life on Mars, President Bill

Clinton held an historic press conference to announce some momentous news: microbial life may exist on the red planet after all. Scientists had found what they believed to be fossilized remains on a Martian meteorite that crashed to Earth twelve thousand years ago. It must be confirmed by other scientists, but clearly the fact that something of this magnitude is being explored is another vindication of America's space program and our continuing support for it, even in these tough financial times. There was enormous excitement over this discovery.

Based on the chemical composition of the meteorite, we could tell that it was from Mars. Inside the rock, researchers found different chemicals and, in particular, different physical shapes of objects that looked extremely similar to microorganisms here on Earth. Soon after the president's press conference, scientists began to backpedal on whether the meteorite actually showed signs of life. They said the original team of experts may have been wrong.

The image certainly looks like some kind of a microorganism, but the opponents said the microorganism remains are too small to have DNA to be inside it. And therefore, it can't be a fossil. Since then, microorganisms have been found that small, which have DNA in them, but it has not been resolved. But given the controversy surrounding the possibility that life may have been discovered on Mars, starting with the Viking mission of the 1970s and continuing to the present day. Some scientists say NASA almost seems to be avoiding the issue. The space agency has never retried Gil Levin's test for signs of life on the red planet. It is very puzzling as to why NASA has refused to send life detection experiments back to Mars. His experiment discovered the most remarkable thing yet known about Mars. That there is something highly reactive in the soil, chemical or biological. But we really should find out what it is. It is startling that NASA has made no attempt to determine that issue.

I truly think NASA knows there is life on Mars, but for some reason unbeknownst to me, it does not want that information out. Has NASA found definitive signs of life on Mars that they're intentionally keeping from the public? And if so, have they found evidence that an advanced civilization once lived on the red planet? Some ancient astronaut theorists believe they have, and as evidence, point to a report commissioned by NASA in 1960 that offers advice for how to reveal the news if the American space program should ever find proof of extraterrestrial life.

The so-called Brookings Report essentially said that in your travels

throughout the solar system, there is a distinct possibility that you will discover artifacts, that you will actually discover evidence of an ancient alien presence on Venus, on the moon or on Mars. And the implications of such an announcement, if it were made, would be potentially devastating to the human race. It could be catastrophic. In fact, it used the word "disintegrate." I would imagine that it would be something that would be kept secret for awhile.

I don't think it's a bunch of men sitting in a room and smoking cigarettes and saying we're going to keep this secret. But it is a responsibility, and I think that they would certainly be very, very careful as to how to let out this knowledge. Is it possible that not just microbial life, but also intelligent beings, once called the red planet their home? And if so, what would that mean for the existence of life elsewhere in the cosmos? If life used to exist on Mars, particularly if it formed independently of Earth life, then life in the universe is all over the place.

That means that of the billions of planets discovered now similar to Earth, through our universe, many of them would have life on them. And if there is life different from life on Earth that has evolved, there would be every reason to suspect such evolution would have occurred on countless other Earths. And that there would be intelligent life out there as well.

We want there to be life on Mars. We want there to be life somewhere beyond here. We want that transcendent connection to the heavens. We don't want it to be invaders, but we don't want to be alone in the universe.

Are tales of life on Mars, found in cultures across the world, simply mythology? Or might Martians really have visited Earth in the distant past, as ancient astronaut theorists suggest? If so, could there be evidence waiting to be discovered on the red planet? Perhaps with further missions to Mars we'll find that not only was it home to alien beings thousands of years ago, but it still is today.

Every day, new discoveries are unlocking the mysterious, the mind-blowing, the deadly secrets of a place we call the universe. Where are the Martians? On the red planet's poison-packed surface or in newly found sources of water? Did Martian life survive an apocalyptic attack? Are Martians microbial rr monstrous? At last, the answers are here in Mars: The new evidence. I believe we can send humans to orbit Mars And return them safely to earth, and that a landing on Mars Will follow.

When we land on Mars, there may be billions of Martians waiting for us.

Only they probably won't look like us or any creatures the movies and novels have perceived.

Microbes, bacteria evolved to survive on a planet. With 1% of earth's atmospheric pressure, Mars is an arid world where temperatures can plunge to 220 degrees below zero. Even if that upper-surface is so nasty, that doesn't mean that just a little ways under the surface, wouldn't be a much happier place for microbial life on Mars.

Is there life on Mars? Just a decade ago, my answer would have been very different than it is today because we've learned so much. A few decades ago, it would have seemed like science fiction. But we now know that on earth, some bacteria cluster around thermal vents at the bottom of the sea; others thrive in pockets of liquid water inside 12 feet of Antarctic ice.

Our knowledge of microbial life on Earth has increased so much that I think there's still a good chance that some kind of primitive life may have formed on Mars and existed there at some point. How could life have first formed on Mars? Maybe with a flash of lightning.

The spring of 2006.

Even as some scientists are claiming Mars doesn't have lightning, Earth-based microwave detectors find it in friction-filled storms of red dust, but it's not lightning like we know it, associated with rainstorms. Well, it doesn't rain on Mars. It's what's called dry lightning and this dry lightning, or static electricity, could have been the trigger for Martian life. Once you have lightning, you've got a new source of energy that can affect your chemistry and alter things in the atmosphere, even on the surface, at some level.

A famous experiment seeking to replicate the creation of life on Earth ran an electric current through a mix of water and common gases, creating a soup, containing organic compounds and the building blocks of life: amino acids. By hitting things with electrical discharges, you could not necessarily generate life, but maybe create the preconditions for life.

But did dry lightning help jumpstart life on Mars? Or did it kill the chance for any life at all? Lightning on Mars could create things like hydrogen peroxide, which could then lead to other chemicals that would destroy organic material and sterilize the surface. The jury is still out on what dust storm lightning has done to Mars. Well, what always happens with Mars is about the time we think we understand it, we discover new things that make us realize we still have a lot of mysteries to solve.

So how do you find bacteria too small to be seen, living under the sur-

face of a planet 48 million miles away? The life that's most likely to be prolific, the life that you'd find the most number of organisms, if they did exist, is the one that's hardest to find.

Like climbers, scientists look for life on Mars by making connections, linking this observation to that deduction, hoping the evidence leads in the right direction. And if the facts aren't there, you start over. It's hard to look for life.

So the mission designers have said, well, let's first figure out if there are habitable places, if there are places that would be friendly to life. And the key element for life as we know it is water. On Earth, liquid water is required for life. Even if it's a small pocket in the heart of a glacier, you still need the fluid nature of water for the processes of life to take place.

According to early space probe photos, Mars was just a dead red rock. Its thin atmosphere was mostly carbon dioxide, and so, it seemed, were the polar ice caps. You know, in the seventies, we might have expected that there was no possible water or life on Mars. The picture is much different today. In the 21st century, more advanced space probes have revealed that a lot of the earlier information was wrong. It turns out, there's about 100 times as much water in Mars' polar caps as in all five of North America's Great Lakes. So even in the polar caps today, there's probably enough water to cover the surface about 20 to 30 feet deep. But it's really not about whether we think there's water on Mars, but whether there's liquid water on Mars. That's the key question, because even microbial life could not have evolved on Mars unless there was liquid water early in the planet's history. In order to find liquid water on Mars, we actually look in a whole variety of ways.

From 1997 through 2006, NASA's Mars global surveyor searches for water-based minerals using a highly sensitive spectrometer. Every chemical element has a particular signature associated with it, a sort of fingerprint. And when light interacts with it, it reemits that light in a very specific way that's characteristic to that given element. And so that's telling you what things are made of by just looking at the light they emit.

It's similar to the way the human ear can pick out specific vibrations. Some notes boom out. Other notes are not so loud. In much the same way, spectroscopists are interested in selecting out those particular lines. The surveyor spacecraft hits spectrographic paydirt: Hematite is a combination of iron and oxygen. Hematite shows that ancient Mars could have had flowing water because the mineral is also found on earth in environments that

once interacted with liquid water.

Round rocks from Utah formed in a sandstone by fluid water flowing inside the pores of the rock and moving iron around so that the iron actually cements together these little spheres. And the ones on Mars are quite a bit smaller than these, but they're thought to form the same way.

The Surveyor's mission is over. But today, five probes are taking pictures and measurements of Mars. Europe's Mars Express circumnavigates the equator; NASA's Mars Odyssey and the more a recent Mars Reconnaissance Orbiter, or MRO, soar over the poles.

Meanwhile, two robot rovers explore the surface, seeking evidence of an-cient water in the rocks. Spirit is in a very hilly, rocky, dusty, rugged kind of place. It's very sort of reddish and bright when you see the pictures from that Rover. Opportunity on the other side of the planet is in a very flat place, darker, more kind of a chocolaty brown color than a reddish color. In the spring of 2008, the five probes are joined by a sixth, NASA's Phoenix lander.

May 25, 2008.

As anxious men and women on earth watch their monitors, the Phoenix lander ends a nine-month space journey, flaming through the Martian atmosphere at 12,500 miles an hour. We taught that baby to fly, you know, and we give him all the wisdom. And now, we have to let it go and do the job.

Any landing on Mars is incredibly difficult. And the chaos happens within six or seven minutes, from the top of the atmosphere to the surface. We call it seven minutes of terror. That's how much time Phoenix has to cut its descent speed from 12,500 miles an hour to five. If not, Mars will have one more impact crater. Years of effort is being tested, whether it's going to happen or not.

The parachute deploys, caught live by the Mars Reconnaissance Orbiter. Thrusters slow the plummet for a near-perfect landing near Mars' north pole. Touch down signal detected.

Phoenix will search for frozen water under the surface. But has it already found more than was expected? A photograph of one of the lander legs seems to show something that should not be there. There is new evidence that Mars could once have supported life. Mineral deposits show that water once flowed on the surface. NASA scientists look for evidence of water wherever they can find it on Mars. But in the spring of 2008, they may have found it in an unexpected place. The Phoenix lander, newly arrived near Mars' north pole, has something strange on one of its legs. Some colleagues think that

those are water droplets forming in that environment, which is a little curious because it's very cold. It's not at all obvious that water should be stable there, but it could be really salty, could be briny, and so it has a lower melting point. That's possible.

I don't know what the blob of water on the Phoenix lander leg was or the thing that looked like that. Scientists are split and Internet blogs run wild with speculation. But in the end, it's all speculation. The unfortunate thing is the data that we have are really kind of fuzzy. We're at the limit of resolution.

You really want to go up there and take a much better picture of it, but it may ultimately be a question that can't be answered. Although the droplets on its leg remain a mystery to this day, when Phoenix's robot arm digs two inches under the Martian surface, it confirms a prediction as it hits hard, icy soil containing frozen water.

Mars Odyssey predicted that Phoenix would land on icy soil with a little bit of dust on top. Phoenix went, touched it. We got another key part of planetary science which is getting "ground truth." While the Phoenix team expected water ice, they're surprised by something else that the lander's laser detects in the Martian sky: Snow. Not carbon dioxide snow, but water crystals, as on earth. It snows on Mars, which is indeed cool.

Phoenix saw it first dissipating high in the atmosphere and eventually, actually, falling to the surface and then sublimating and going back to a gas when the sun came back up. It really is one of the first times we're really seeing the surface atmosphere water cycle. In this case, gas to solid, solid back to gas.

Meanwhile, roving robots explore near the equator. Spirit and Opportunity use high resolution imaging and spectroscopy to find evidence of minerals and land forms shaped by water in Mars' ancient past.

A day in the life of the Mars rover starts as the sun rises and illuminates the solar panels. And that wakes up the rover. The radio commands are sent from the earth to tell it what to do. This time, drive 10 meters forward, and then stop and turn 20 degrees and then take a panorama with these colored filters looking off in that direction.

Near the end of the day, one of the NASA orbiters, like the Mars Odyssey orbiter, or the Mars Reconnaissance Orbiter is passing overhead and we know when that's going to happen. The rover will transmit data from that day up to that orbiter and then that orbiter relays it back to the earth. And while it's sleeping, we've got those pictures that it just sent back and other

data.

And now, we're trying to figure out what happened. Did it do what we're expecting it to do? Did it do something unexpected? Is it in some dangerous situation? In early 2008, signals from spirit indicate trouble. Its right front wheel jams.

When the Phoenix team tries driving the rover in reverse, the dragging wheel gouges several inches into the soil and hits silica. On our own planet, where do we find silica? Well, hydrothermal environments. Maybe that's what we're seeing on this other world as well. So a lot of the excitement about silica is because of that connection to our own planet. That indicates that maybe those kinds of environments existed on Mars as well.

In fact, the Spirit rover may be parked at one right now, right next to what may have been an ancient Yellowstone-like hotspot. It's a classic accidental discovery, And raises the question: could Mars have current underground thermal activity? Is Mars still hot in its interior? It certainly is. And there's no way that Mars has completely cooled off. All the heat of its accretion, all the heat of its formation, some of it is still there. Plus, heat from radioactive elements.

There's definitely sufficient heat inside of Mars to make hot fluids percolate. But there is that possibility where you might find liquid water at some depth in the crust.

In Yellowstone and at hot springs all over earth, many different species of bacteria feed and grow in the gas and mineral-rich waters. Could hidden hot springs be breeding grounds for life on Mars? We would love to send electromagnetic sounding instruments to the planet because they could actually tell us whether there is liquid in the crust at some depth. That would be fantastic. Then we'd know.

While the Spirit team wonders about Mars' underground mysteries, the Phoenix team finds another surprise: the surface around the Phoenix lander is composed of perchlorates, combinations of chlorine and oxygen. The discovery of perchlorates on Mars has been fairly controversial because on earth, it's a very toxic substance. On earth, perchlorates are used as propellants in fireworks and rockets. This was a surprise. So it was a discovery. Why is it even there? How is it forming? But the question of perchlorates is a really good question and it's not an easy problem to solve. There's no definitive answer.

Perchlorates do occur naturally in places like Chile's Atacama desert as

ultraviolet radiation from the sun transforms chlorine and oxygen. On Mars, many of the same kinds of chemical reactions might be happening on the surface. We don't understand the details of the process, even on the earth, let alone on Mars.

The challenge with perchlorates is they affect some of the experiments that people use to look for organics for carbon-based molecules like you might find in life. Some scientists are now reconsidering the famous 1976 experiments by the Viking lander. When Viking went to the surface in 1976, they found no evidence whatsoever for organics. One of the recent theories that's being bandied about is that if you did have perchlorates in the soil, that those might have actually broken down the organics in the same process you were using to try to detect them as you heated the soil up.

Perchlorates may have destroyed organic materials in the Viking experiment. And on earth, they're a key poison in many chemical runoffs. But perchlorates are also power sources for certain bacteria. Bacteria actually used to eat toxic waste. And in terms of life, it's a good news, bad news thing. While microbes might feed on the toxic soil, it could be deadly for humans on Mars.

We don't know how that perchlorate compound might be changing the surface. The surface might be in some kind of a super-oxidated state that could ultimately prove to be, for example, corrosive to astronaut suits.

One thing is certain, after five months of exploration, Phoenix's mission is threatened by a dust storm, sweeping across the Martian plains, burying everything in its path. In a storm so fierce, the Phoenix lander is doomed.

When NASA's Phoenix lander digs into frozen water on Mars, it finds new evidence that the red planet could once have harbored life. But in the Autumn of 2008, Phoenix's own life is about to end. On Mars, the wind comes along and whips up the dust, which is very, very fine-grain like flour, extremely fine-grained material, whips it up into the atmosphere and it slowly settles out, blanketing everything.

Red dust coats the solar panels of the Phoenix lander. Sunlight, its only source of power, can't get through. The Phoenix lander has to spend a lot of time recharging its batteries because we know that it's going to get very cold at night, and it's going to have to run those heaters at night to stay alive.

On November 2, 2008, Phoenix shuts down for the last time. As the Martian winter deepens, frozen carbon dioxide piles up and imprisons the probe in a tomb of dry ice. But Phoenix's data continues to be analyzed.

MARS: GOING HOME

Going to Mars and taking measurements on the surface, getting detailed data about the history of Mars and Mars' chemistry of the surface was an essential piece to determining for sure that water existed on Mars. Water is essential to life.

But according to the latest evidence, it's only one of many forces that shaped Mars. You can break down our thinking of Mars now into maybe like four quarters of a football game. The first quarter is action packed. Mars forms along with the other planets as swirling gas and debris combine and cool into a rocky world. Then Mars is bombarded and scarred by meteoroids. There was a lot of cratering going on. And then towards the end of that period, there was a lot of geologic features that suggest that there was water flowing on the surface. That new evidence includes a series of ridges, photographed in 2009 by NASA's Mars Reconnaissance Orbiter. It's the first definitive lakeshore discovered on Mars, the remains of a lake the size of north America's Lake Champlain.

Every piece of evidence about the presence and the history of water on Mars is so important to determining whether we might be alone in the universe. Some scientists even say that 3.5 billion years ago, an ocean the size of the Atlantic covered 1 /3 of Mars. Maybe with enough time and enough water, life formed on Mars as well.

As the first quarter of Mars' history ends, the second starts with a bang as volcanoes reshape the planet. There was significant volcanic activity. Olympus Mons is the biggest volcano in the solar system. So we know there were big volcanoes in the past.

Mars is blanketed with black volcanic basalt, like the basalt found around Hawaiian volcanoes. And the chemicals released from volcanoes, including sulfur, mixed with the water that was left, make things acidic, kind of like acid rain on earth and that sort of thing. At the same time, the atmosphere seems to be shrinking and water becoming more scarce and less stable on the surface. The loss of Mars' atmosphere meant that liquid water could no longer exist on its surface.

Water exists on the surface of the earth only because of the atmospheric pressure pushing down on it. Whatever water is on Mars evaporates or freezes. In the third quarter of its history, Mars probably begins turning red from ferrous oxide. Rust in the dust.

Take a fresh volcanic rock In Hawaii or Iceland and let it sit out in the Earth's atmosphere and it's going to turn red and brown over time. It's going

to oxidize. Same kind of thing could have happened on Mars.

In its final quarter, Mars goes into a deep freeze. From around 100 million until 2 million years ago, large glaciers form and carve out new patterns in basins and craters. From a warmer, wetter planet to a cold, dry world.

Mars in a nutshell, according to recent evidence. It had a thicker atmosphere. It had water, it may have had rain, it had snow. Has all kinds of things that are familiar to us. And it's just fascinating to think that we can go back in time with these missions and study an early, sort of earth-like Mars that's now gone.

But while there's strong evidence for past water on Mars, 2009 satellite pictures seemed to show something impossible: flowing liquid water on the surface. There could be events when water that has been kept subsurface or frozen comes gushing out and runs down the walls of these craters. This is one of the most exciting things in the past decade is seeing those pictures of the gullies, because when I grew up, I was taught that there's no way liquid water could be stable on Mars today, and this kind of flies in the face of the physics, right? And that's kind of exciting because it means that we might have something wrong.

The initial announcement of finding them proposed that ice was melting or an aquifer coming up; there's a whole different set of theories and recent study that it could be from carbon dioxide. The dry ice going to a gas and then that gas basically doing a gas lubrication of the sand that's flowing down. And frankly, it's still in the midst of exploratory science right now. And some of these marks have been shown to be dust flows. I hope not all of them. I'd like them to be water.

From ancient oceans to yesterday's flowing gully, the search for water and life on Mars is an ongoing quest, a quest that like a climber's path along an unfamiliar course is filled with false starts and unexpected detours. Could Mars once have supported life? Mineral evidence from probes like the Spirit rover is encouraging, but it can be radically over interpreted. And we have to be careful not to jump over a line that goes beyond what the current data, the current experiments, the current hypotheses can support. But it's hard as human beings not to just jump over that line.

In 2008, thousands jumped to an incredible conclusion, when a picture taken by NASA's Spirit rover goes viral across the Internet. Does this figure look amazingly like pictures supposedly taken of Bigfoot? Is this proof of life on Mars? No. It's a two-inch tall rock.

MARS: GOING HOME

We still do not have definitive evidence for the existence of life on Mars, ever. Like the 19th century canals and the 20th century face, the Martian Bigfoot is a 21st century trick of the light and sometimes people don't know how to distinguish between the facts and the science fiction.

If there is or was life on Mars, it probably evolved very early in the planet's history, when Mars still had a magnetic field shielding it from harmful space radiation. The evidence that Mars used to have a magnetic field lies in the crustal rocks. Most of the crustal rocks have a magnetic field frozen in when they solidify. These magnetic rocks, scattered across the red planet, give Mars its own version of earth's northern lights as discovered in 2008, although it may not register as visible light to human eyes.

On earth, when charged particles from the sun get trapped in earth's field lines, smack into the atmosphere, they cause the atmosphere to gain energy and then emit a glow. The European spacecraft Mars Express recently detected Aurora on Mars. And what's actually happening there is that there are charged particles streaming down magnetic field lines being made by remnant magnetization in the crust.

But how did Mars lose its magnetic field? One theory: a little less than four billion years ago, as Mars cools, its molten iron core solidifies and stops turning. The motions within the core weren't sufficient to generate an electric current producing a magnetic field. But there's also a faster and far more violent hypothesis. Another more recent idea that's pretty controversial, is that Mars had one or more fairly large moons that were actually captured satellites. And those moons tidally heated the interior and kept it molten, allowing currents to be generated and thus producing magnetic field. Now, if a half a billion years after Mars' formation, those moons crashed into the planet, that could have destroyed the magnetic field. For most scientists, the pieces of the impact theory don't fit. Could satellites large enough to do such damage lose enough inertial energy to be captured in the first place? This idea that Mars had moons that crashed into it within the first half billion years is pretty unlikely, but it's not completely impossible. Questions about Mars' magnetic field and the search for life intersect in the Martian meteorite ALH84001.

In 1996, some scientists said it contains fossilized Martian microbes. More scientists say the objects are non-biological. All the time since then, people have been working on this poor little potato-sized meteorite, extracting more and more information, but there's actually some new results being presented. In April 2010, researchers with new radiometric tools announced that ear-

lier estimates of the meteorite's age are wrong. It's actually younger by a half billion years than we thought, roughly.

The older date had placed the rock at a time when Mars was still solidifying, maybe too early for even microbes to have evolved. The new date places the meteorite at just under the time, if you thought Mars was habitable, that would be the time you would choose, because we think there was water flowing on the surface and it was warmer, and Mars had a thick atmosphere.

But how can a meteorite from Mars end up on earth? We've actually found meteorites here on earth that are undeniably from Mars. There's about 50 of them known. Well, what we think happens is that asteroids occasionally slam into Mars and throw chunks of rock out into space and earth's gravity can also pull them in. So they land here and we find them. And in this way we can actually study pieces of Mars here on earth.

In 2010, NASA announces that more advanced electron microscopy of ALH84001 reveals new details of iron oxide crystals called magnetite, a mineral with its own magnetic field that on earth can be created by certain ocean-dwelling bacteria. Bacteria here on earth have figured out how to grow magnetite crystals in their own bodies that help them to orient to the earth's magnetic field, in order to help them swim in the ocean and orient while feeding.

Are the crystals in ALH84001 fossilized magnetite created by Martian bacteria to help them hunt and feed in an ancient ocean when Mars still had Its magnetic field more than 4 billion years ago? If they are fossils, of course, they'd indicate that early Mars had fairly sophisticated life.

That's still being debated and the bottom line is there's still a heck of a lot of scientific work being done and a lot of debate about Mars' meteorites, and whether there's any evidence of past life in them. But the latest and most compelling evidence of Martian life isn't in an ancient meteorite, but on Mars today, even though this new evidence is invisible.

For years, scientists looking for life on Mars have followed the water, but there may be something to follow that's even more dramatic. Between 1999 and 2009, spectrographic observations of Mars detected a combination of carbon and hydrogen called methane gas. The discovery of methane on Mars, in Mars' atmosphere, was a real surprise to people. Plumes of the gas seem to be coming from a few "hot spots" during the Martian summer. The trouble is there shouldn't be any methane on Mars.

On Mars, even just the presence of methane is a little bit mysterious be-

cause it breaks down. On earth, the unstable methane molecule disintegrates after about 300 years. But on Mars, high doses of ultraviolet radiation and perhaps the newly discovered dry lightning in the thin, dusty Martian atmosphere break the methane down in just a few months. And so, if you see it there, it means there must be something resupplying it. Even though it's being broken down, it's getting resupplied.

Where's the Martian methane coming from? On earth, volcanoes produce vast amounts of methane. But even though Mars has Olympus Mons, the largest volcano in the solar system, it hasn't erupted for millions of years. So what are the other choices? Methane can be produced underground when basaltic rock gets turned into a mineral called serpentine and that releases methane and that methane can seep up through the ground and come out in the atmosphere. But this process requires hot liquid water which hasn't yet been found on or within Mars. Could be volcanoes which we don't know to be active on Mars. It could be some subsurface chemistry with liquid water which we don't know to be on Mars, or it could be due to biology.

On earth, 90% of methane comes from bacteria in animals and plants. Is the Martian methane coming from underground colonies of bacteria? The discovery of methane on Mars could lead to headlines of us having definitively found evidence for life on Mars. And entire chat rooms were set up to discuss these various creatures but, in fact, though the discovery of methane is interesting, it doesn't mean that we found creatures wandering around on Mars.

Maybe it is life. It's an arrow to something and maybe the thing at the end of the arrow is life. The search for the source of Martian methane has become a priority for explorers and is on the mission list for the next rover to be sent to Mars. So we're looking at a so-called test bed version of the Mars Science Laboratory rover. And the Mars Science Laboratory, when it gets down to the surface, will measure methane. So we'll know the answer once that rover gets down there.

The Mars science laboratory dubbed "Curiosity" launched in the fall of 2011 and landed in 2012. It's the size of a small car and will use an amazing new landing technique, the sky crane. At about 60 feet above the ground, the rover is separated from the descent stage and lowered on a line, which we call the bridle, and slowly lowered to the ground. When the rover's wheels touch down on the ground, the descent stage detects that. It cuts those lines and then it flies away and it crashes safely far away and the rover is on the ground, on its wheels, ready to go do its job.

The high-frequency radar, essential to the sky crane landing, was mounted to a helicopter and taken for a test-drive at California's Edwards air force base. When you're coming down on Mars, developers do a bunch of simulations and analysis to go ahead and give us bounds of what we expect to see in terms of descent angles, in terms of attitude rates on the parachute. During the entry, descent, and landing, the radar tells us where the ground is and how fast we're going. That information is used by the control system to control the thrusters to make sure we touch down at a nice gentle speed. We test little pieces here and little pieces there, so the first time that we test it for real is on Mars.

The key objective of the Mars science laboratory is to search for signs of ancient habitats. And so the rover will rove up to areas that had been soaked in water in the past and may contain trapped organics. So if we find those kinds of layers, we can go up to that kind of a rock and we can drill into it and take the material from inside the rock and tell with a lot of precision what the rock is composed of, whether there's organics in there. The Mars science laboratory will be one more link in a chain of exploration to understand that bright red dot in the dark night sky.

Put together all the new evidence and it adds up to the need for more evidence. We don't know how the magnetic field was lost. We don't know exactly how the atmosphere was lost. We don't know where all the water went. We don't know whether the methane is produced by life or just regular abiotic chemical reactions. But maybe questions that baffled the 19th and 20th centuries, will be answered in the 21st.

I asked five other Mars scientists: What percentage chance would each of you give that life ever formed on Mars? Four of us thought it was maybe greater than 90% chance, that there had been life at some time and may be now life on Mars. And two of us thought it was less than 15%. And the follow-on question then is, if you think that there's a less than 15% chance, is it really worth going to look for it? And the answer was immediately, "absolutely." I don't think that rovers and landers and orbiters are going to find life on Mars. My personal opinion, I think it's going to take people.

I think there will come a day when people go to Mars digging and drilling and thinking and just going with context and gut feel and putting the pieces of a very complicated puzzle together. I'm optimistic that we're going to find evidence of past life on the dusty red planet.

Every day, new discoveries are unlocking the mysterious, the mind-blow-

ing, the deadly secrets of a place we call the universe. You're lost on an alien planet. Food is running low. Oxygen is running out. Help is 100 million miles away. Mars...my God....it's a lethal place.

Where can you hide from blasts of space radiation? Charged particles would be hitting any astronauts on the surface. They would not be protected. How can you stand up to a deadly dust storm? The dust on Mars could eat away at the fabric of a space suit. That would be catastrophic. What will you do when you run out of air? You will die a horrible death.

How can you survive crash-landing on Mars? Humans crash landing on Mars. Struggling to survive on a hostile world. It's been a favorite theme of science- fiction movies. They got a lot of things wrong. But NASA and other space agencies are planning to send people to the red planet in the next few decades. So the questions of crash-landing and survival have to be taken seriously.

Well, think about what you're trying to do. You're sending a mission to Mars, you're sending it to an unknown location within an unknown environment. All it takes is one thing to go wrong then you've lost the whole mission.

This program, based on recent scientific information, presents one possible scenario of what might happen in the near future. Imagine that international crew has been selected to explore Mars and set the stage for a permanent base. In old movies, such crews were brave, skilled, and resourceful. Well, the movies got that part right. The bottom line is that when we're dealing with a small human, what and who you end up selecting is really very important.

Who would you send to Mars? Not jacks of all trades, who are aces at none. You want aces at many trades on your crew. The most important skill among the crew is that of mechanic. I would have two of the four members of the crew selected primarily for their ability to fix things. After mechanic, the most important skill among the crew is that of field scientist, people that are qualified to follow hints in the geology to find fossils or to find places where we can drill for water—okay, in plain terminology, two mechanics and two scientists.

But here's something old movies got wrong, the idea that humans will fly to Mars in a single needle-nosed spaceship. Unlike the case in many old science- fiction movies, it's actually cheaper and more efficient to send a bunch of material to Mars on different rocket ships. If you try to put them on

one rocket ship, it turns out that that ship has to be enormous and probably nuclear-powered, and there's all sorts of dangers and problems associated with that.

In most real-life scenarios, the Mars astronauts will land and leave in separate crafts. The habitat module, or hab, will be their home during their stay on the Martian surface. They'll take long-range trips in a pressurized rover packed with all the necessary survival materials along with them on the hab. A smaller rover, for shorter trips, has been pre-positioned at the landing site along with the astronauts' ride home, the Earth Return Vehicle, or ERV. The ERV isn't just waiting for the astronauts— It's transforming Martian resources into rocket fuel and breathable air.

The Earth Return Vehicle runs a pump which sucks in the Martian air, which is 95% carbon dioxide gas, and we can react that carbon dioxide gas with a small amount of hydrogen that we brought from Earth to produce a large supply of methane fuel and oxygen.

Your crew of four astronauts land on Mars near the Earth Return Vehicle, they use their habitat as their laboratory, as their exploration base, but when they're done, they get in the Earth Return Vehicle and they fly back to Earth. They leave the hab behind on Mars, so each time we do this we add another hab to the base, and before you know it we've got the beginning of the first human settlement on a new world.

So where should we land on Mars? Well, Mars is a fascinating planet— there's a lot of interesting areas. It might be better, initially, to choose a region near the equator, especially a flat area, but also near geologically interesting features. One thing that mustn't go wrong is the hab's landing technique, called aerobraking.

Aerobraking is the art of using the friction of the Martian atmosphere to slow down the spacecraft. Imagine this ball is the habitat module entering the Martian atmosphere. Now, we could use rockets to gently slow this thing down and land at the desired spot, but that would require a lot of energy, which requires fuel, and that's heavy and expensive. Instead, we could let the Martian atmosphere slow the hab down. And only near the very end, when it's getting very close to the surface, would we turn on some retrorockets and use a balloon parachute called a ballute to bring it to the desired location.

Now, the danger is that if the angle of entry is wrong or the speed is too fast, then, in fact, friction can overwhelm the heat shield, the aeroshell, and

the hab can burn up like a meteor in the Martian atmosphere. And even a slight miscalculation can lead to a landing that's too rough or in the wrong place. There's about a thousand things that have to happen.

Come in on a heat shield, going quite fast, use the friction of the atmosphere to help slow you down. The heat shield needs to be jettisoned. You need to aerobrake through the atmosphere as much as you can, you need to pop out a parachute to slow yourself down. You probably then need retrorockets at the bottom. You need to cut the parachute to get it away from you. This is extremely difficult, among the most difficult things there is to do.

Then, a few miles above the surface, something goes very wrong. The hab hurtles into a Martian dust devil of terrifying proportions. Dust devils on Mars are vortices in the atmosphere, rapidly spinning columns of air that lift dust off of the surface and loft them into the atmosphere. Now, on Earth, dust devils may only be a few hundred feet high, but on Mars, they can be 3 to 4 miles high. So they're simply immense structures.

The dust devil engulfs the hab, throwing it dangerously off course. Tracking stations from Texas to Kazakhstan are following the descent, but Mars is so far away, it takes 18 minutes for the hab's transmissions to reach Earth.

When the signal comes through that the hab is headed for a crash-landing, the astronauts have already crashed. But where? And are they alive or dead? There's only one thing you can do at launch, and there's only one thing you can do at landing, and that's pray. Somewhere on Mars the astronauts are alive but communications are out. They can't talk to Earth. Worse, the dust devil has taken them far off course.

When humans first land on Mars, it'll be a truly magnificent event. One of the most historic events ever. But, you know, our astronauts crash-landed. So they're going to step out not knowing where they are or what's going on.

The Sun would be about half as bright as it is here. The intensity of sunlight at the Martian equator is about the same as that in Norway on Earth, or Alaska. In shadow, everything on Mars would have this kind of yellowish-brown-reddish hue, and only things in direct sunlight would show their more true color, and that's because the light is being bounced around amongst all these reddish dust particles. It'll be a wondrous scene, but they won't have much time to enjoy it because they need to figure out where they are, how to get themselves to safety, and what to do.

How do you find out where you are on Mars without instruments? These

21st- century astronauts fall back on an ancient technique, celestial navigation. The Martian moons, Phobos and Deimos, they're both in equatorial orbits. The point at which they rise, that would be due east. The point at which they set would be due west. At their zenith, to the extent they deviated from being directly overhead, that would tell you how far you were from the equator. The time of rise and set, if you compared that to an almanac, which you might have in your computer, would tell you your longitude. The results are shocking. They have crashed in the eastern half of the largest canyon in the Solar System.

Discovered in 1971 by the Mariner 9 probe, and named for it, the Valles Marineris is just south of the Martian equator, several times as deep as the Grand Canyon and as long as the continental United States. The astronauts are hundreds of miles from the Earth Return Vehicle, and there's worse news. The damaged hab is leaking oxygen at a critical rate. It can't be repaired. The crew could be dead within days.

It's a near future scenario that might happen. The first humans on Mars are hundreds of miles off course. Stranded deep in the gigantic Valles Marineris. They can't communicate with Earth and their damaged habitat module is leaking air. Almost every Mars movie imagines a breathable atmosphere in at least one section of Mars so the actors can take off their helmets. But, in fact, Mars' atmosphere is 95% carbon dioxide and as thin as Earth's atmosphere at 100,000 feet.

I'm often surprised by how caught up we can be by this sort of romantic vision of Mars. It looks like Utah or California here. But the truth is it's a lethal place. The astronauts have one chance, and they take it. They assemble the rover, which has a three-week air supply. A pressurized rover is sort of your RV.

You are living inside the rover, it's pressurized, you're in shirt-sleeves. You don't have to be wearing a space suit while you're driving it, or living, or working inside. The rover is functional and so its communications system, the astronauts radio home that they are alive.

If some component or something goes wrong on it, there is a backup that wouldn't lose ignition. So redundancy can be a very good thing, or at least the ability to design for a failure if you will. But the conversations are not like the constant back and forth of the Apollo Moon missions.

Imagine this ball represents a message, a conversation between an astronaut on the Moon, me, and mission control in Houston, Texas. Now I'm

standing a few inches away from Houston, but, in reality, the Moon is about 240,000 miles from Earth. Now, radio waves travel at the speed of light, 186,000 miles per second, so it's only about three seconds between "how are you?" and "I'm fine." Pretty easy to hold a conversation. But Mars is, at minimum, about 150 times farther away than the Moon, so I have to go all the way over to here. We can still communicate, but there's a longer delay. In reality, the distance between Earth and Mars is between 35 million and 240 million miles. So the time lag between "how are you?" and "I'm fine," can be between about 6 and 44 minutes. That's for a complete exchange. So if there's an emergency, it can't be dealt with in real time. But there's a bigger problem. Like visible light, radio waves travel only in a straight line, and both Earth and Mars rotate on their axes, so there are times when people on the two planets can't communicate with each other. We can solve this with two properly positioned satellites. If there's a satellite orbiting Mars, a message can be sent from Mars to mission control in Houston. It gets sent to that satellite orbiting Mars, then to the Earth orbiting satellite, then to mission control, and back again. Now, there's still a time delay of up to 44 minutes between question and answer, but at least the Mars astronaut and mission control can formulate a survival plan.

Working through the communication lag, the plan takes shape. Load the fuel-cell powered rover with food and equipment, and drive it east to where the Valles Marineris empties into an outflow valley, probably carved out billion of years ago, when Mars had a thicker atmosphere and liquid water still flowed on its surface. From this exit point, it's less than a day's drive to the Earth Return Vehicle at the original landing site. So you can imagine having a desperate trip across the Martian landscape to get back to the Return Vehicle and perhaps do a little bit of scientific research but most importantly, save yourself and get back to Earth. Everything depends on some very cold equations.

Each astronaut has a daily need for 3 gallons of water, 2,000 calories of food, and survival technology can help. They can extract water from Mars itself using equipment onboard the rover. The Mars Odyssey spacecraft has shown that average Martian dirt in the equatorial regions is 6% water by weight. So if you want to get water out of that you can just take some of it and throw it into a pot like a pressure cooker with a L.E.D. and heat it to 150 degrees C and you can cook out the water. And if you put in about 2 gallons of dirt, you'll get about a pint of water.

But other human needs are not so easily supplied on Mars. Certainly on

a two- week journey, if you had to make it across a desolate Martian landscape, you could cut down on food. You could have starvation rations. You can even cut down on water. But the one thing that you absolutely need, minute by minute, is air. You have no flexibility in the amount of air that you need to make it for a specific amount of time. Despite the need to get to the ERV, there is enough air for several brief EVAs, or extravehicular activities. Part of the reason for sending people to Mars would be to do some compelling science, so we would imagine them taking samples, analyzing them, trying to understand the environment when those rocks formed. Things like that. Astronauts could use a whole variety of tools, hammers, hand lenses, spectrometers of various sorts, chemical analysis machines.

There'd be probably some mobile laboratory on the rover that would use the materials that they gathered to look at the composition, and so on. There's a number of theories as to how the Valles Marineris was created. It's still not fully clear how the structure came to be, but, in most likelihood, quite a few processes were involved. I think that being on the ground and doing field geology is essential to really understanding the processes that had sculpt a complex landform like the Valles Marineris. It's not a simple story.

It wasn't just a crack in the earth, it wasn't just fluid flowed in and formed that. There were different processes, acting at different times, layering on top of each other, forming a complex book. And in order to read that book, you really need to be there to turn the pages. Valles Marineris has a whole variety of different segments.

There's places in the middle where there's one, two, three, or even four parallel canyons where you go down and up and down and up and down and up. And then, at the very eastern end, it looks like water came flushing out through what would be a chaos zone, catastrophic floods of water that might have come out.

Was there life in that water? Could some of the rock samples they dig up have enough evidence of fossilized bacteria? Mars was once a warm and wet planet, and we know that for a fact because there are water erosion features all over the surface of Mars. To look for fossils of life, you want to look for places where water has flowed or accumulated, and the Valles Marineris might be one of those places. Is it even possible that they will find evidence of liquid water under the surface and in that water living organisms? Will life form anywhere that liquid water is stable? Or is there a one-in-a-trillion chance occurrence that leads to life? Was there a second gen-

esis on Mars? I think it's certainly possible that there's bacterial activity on Mars now, but that's by no means certain. It's a very interesting current scientific question. I think it's one of the sort of most intriguing questions in Solar System science.

Suddenly, the search for life pauses as the fight for survival resumes. Mission control signals that a high risk solar flare is headed for Mars. A solar flare is a tremendous outburst from a relatively small region of the Sun. A huge amount of energy goes pouring out explosively, and a bunch of energetic charged particles go zooming through the Solar System. They can interact with cells and harm them. Also, high-energy electromagnetic radiation like X-rays gets produced, and those can harm us as well. So it's "wham!" and then "wham!" again sometime later.

Earth's magnetic field shields us from the worst effects of solar flares. But Mars lost its magnetic field 4 billion years ago. After a solar flare is seen by people on Earth, we want to warn the astronauts on Mars. Now we can't warn them about the electromagnetic flash because our warning signal would travel at the same speed as that flash from the Sun, but we can warn them about the onslaught of charged particles. The high-energy charged particles can travel, perhaps, at half the speed of light.

The hab has a radiation-proof chamber, but it's now too far away. While the astronauts' space suits shielded them from the solar flare's x-rays, they have only minutes to seek shelter before the flare's high-energy second wave slams into Mars. If a future human mission to Mars crash-lands, the astronauts will have to contend with even more than the harsh Martian landscape. A solar flare of charged protons would be far more dangerous there than on Earth.

Well, Mars doesn't have a magnetic field like the Earth does so all of these high energetic particles and these charged particles would be hitting the surface directly and hitting any astronauts that we had on the surface. They would not be protected from all of these dangerous rays and these dangerous particles, whereas on Earth, we're comfortably protected by our magnetic field. There are a number of bad effects that would come about from the energetic particles hitting an astronaut on the surface. Increased rates of cancer, for example, or other diseases, radiation sickness, and radiation poisoning. In fact, astronauts aboard the space station have occasionally been told to hide in special chambers to protect them against the charged particles and radiation coming from the solar flare. For the astronauts in the middle of the Valles Marineris, the only shelter is their pressur-

ized rover. The rover's primary radiation shielding isn't lead. It's the food packets lining the walls, along with the astronauts' own waste material. Feces contain hydrocarbons, and hydrocarbons contain hydrogen, and hydrogen is a very good absorber of radiation.

Hydrogen that you have in the form of food before it's consumed will help shield you from some portion of this radiation, and certainly once you've consumed your food you want to put your feces in these little blocks and back in the wall of the vehicle to shield you from radiation.

If you're going to survive in space, almost nothing can go to waste. Not even waste. With the immediate crisis over, the journey to the Earth Return Vehicle continues. Then, something unexpected happens. The astronauts take a vote and change the plan. Rather than using the ERV to fly home 500 days ahead of schedule, they will stay and complete the mission.

The team on Earth is going to have much less knowledge of the circumstances of the crew and the real options opened to them than the crew themselves have.

So I think that a Mars mission is going to have to be commanded from the front, and that, rather than having a mission control, we need to have a mission support. The astronauts' new plan is to make it to the Earth Return Vehicle and use it, in place of the hab, as their base of operations. It's much smaller than the hab, but it has a power supply and it has the ability to make extra oxygen. So the crew could, in fact, go to the Earth Return Vehicle and live in it and work out of it. The astronauts' confidence on their survival shoots up as they reach the outflow channel at the eastern edge of Valles Marineris.

There's enough food, water, and air to make an easy drive to the ERV. Then, an astronaut sees something unusual. An exposed layer of rock that looks like it might contain something called stromatolites. On Earth, we had bacteria, and not just individual bacteria but bacteria that formed colonies, which created rocks known as stromatolites. These are, you might recall, the bacterial equivalent of coral reefs, where tiny organisms build up something big. This would be a logical thing to look for on Mars.

Stromatolites on Earth provide the kind of evidence that we would expect to see on Mars, not on that exact form, but it's the basic idea. Stromatolites were sort of massive colonies of organisms and then filled with like a material built up and formed macroscopic structures which were then preserved. If something like that was occurring on Mars, that would provide an easy way of determining that life did indeed exist there.

MARS: GOING HOME

Many science-fiction films are based on the idea that we'll find evidence of advanced civilizations on Mars. Mars has no cities or grand structures. But astronauts may yet find evidence of life on Mars even if it's only fossils of bacteria. With the rock samples loaded in, the rover tries to head off but goes nowhere. One wheel is stuck. The astronauts cannot free it.

Sand is sort of the death trap of Mars, and I wouldn't be surprised if, in future expeditions, we end up losing some crews that are on these long pressurized rover traverses to sand traps. They calculate the remaining distance to the ERV. Could they walk to safety? A space suit's full tank of air will only last 12 hours. It would take 30 hours of continuous walking.

On the Earth, you can get stuck when you are doing all-terraining in sandy areas, but, of course, on the Earth, you can just step outside the vehicle and breathe. On Mars, you won't have that option, so if your vehicle is stuck, and there's no way to get it out of its predicament, you're going to watch yourself die. In our scenario of what might go wrong for the first human mission to Mars, the astronauts' rover is trapped in the Martian sand. The Earth Return Vehicle is 100 miles away.

Are the astronauts facing certain death, or can they save themselves once again with pre-industrial technology? So let's say the crew was stranded and they need to get at least one person, a considerable distance to secure another vehicle and come back and rescue the rest. Could they do this with ballutes? It's just possible.

Engineers on Earth run tests to see if a balloon could carry at least one astronaut over the desert to the ERV. You could do this by stretching a synthetic membrane of some sort around a pocket of the surrounding air, that is carbon dioxide. And then you'd have to heat the air inside in order to give it some sort of buoyancy. Now, one way of doing that is having solar heating. Effectively have the membrane absorb solar energy, heat the carbon dioxide inside and then it expands, becomes a blend and lifts the balloon up. Any balloon that you would construct to fabricate on Mars would have to be very large to compensate for the very low density atmosphere.

The Martian atmosphere is very thin. It's less than 1% of Earth's atmospheric pressure at sea level. That means that to get substantial lift, you need an enormous balloon. A balloon that is 10 meters in radius is probably enough for one astronaut in a space suit.

Why would a crew on Mars have a balloon that big? They probably wouldn't, but they might have a large number of balloons used for scientific

purposes that were smaller than that.

The risky plan is put into action. In a makeshift harness, one astronaut rises into the Martian sky. A mile up, winds blow her towards the ERV at 60 miles an hour. On Mars, the prevailing winds near the surface blow from west to east, and we want to go from west to east. So that's good for us. One of the big problems with this scenario is the precision at which you could hope to reach your destination. But if you could then come down within hiking distance of your destination, it'd take some luck, but it's possible.

Mars has only 38% of Earth's gravity. Science-fiction movies usually forget that fact, and have astronauts operate in normal Hollywood gravity. The truth is, even with the heavy space suits worn during extra vehicular activity, hiking on Mars will be easier than on Earth. Let's say you're a 150-pound person and you put on a 200 pound suit— That's 350 pounds. But then, if you only weigh 38% of that, okay, then your weight is maybe 120 pounds with the suit, so you actually have less of a burden walking with that suit on Mars than you have walking in your stockings on Earth.

The astronaut lands successfully and manages to hike to the ERV and the two person rover. Everything is in working order. So one of the astronauts gets into a dune buggy rover, comes back to the pressurized rover, takes one of the astronauts, brings that astronaut to the Earth Return Vehicle then goes back and forth a couple of more times to get all the astronauts over to safety.

That's the plan. But then a new danger arises, a storm of red dust. The sun would get dimmer in the sky, and it would continue to build and build, and you'd see, from horizon to horizon, this very thick dusty swirly mass in the atmosphere.

But what causes dust storms on Mars? You might be surprised to learn that dust storms on Mars are actually caused by energy from the Sun. The Sun heats the dust in the surface of Mars and also that atmosphere, causing it to expand and causing convection currents to occur, and there are difference of pressure between one pocket of air and another, that leads to winds. Then more dust gets kicked up and more heating and more of these pressure differences, so you get these violent dust storms.

The dust on Mars could be very hazardous to astronauts for a number of reasons. Because there's no water on Mars, the individual grains are not smooth and rounded like you would see on a beach here on Earth. They're actually very sharp and jagged. As that dust gets kicked up as the astronaut's

walking or moving, it gets caught on the space suit. And, over time, due to friction— let's say the astronaut's moving arms or his legs, it begins to eat away at the fabric of the space suit. So you could easily get a tear or a rip in the space suit, and that would be catastrophic.

Despite the dangers, the astronaut takes the small rover, loaded with extra oxygen, out into the storm. And one by one, she brings her crew mates back to the Earth Return Vehicle. But just a few feet from safety the abrasive dust tears a section of the commander's suit, exposing him to the near-vacuum of the Martian atmosphere.

If your space suit springs a leak, or if it's a violent decompression, where your suit is ripped open, you might not have more than a few seconds to remain conscious and see what's going to happen to you. You would be in a very bad way. You would be not dissimilar to coming up from a very deep dive on the Earth. It would be a very painful experience. If you have a decompression problem it can get very serious and lethal. You would die a horrible death and very quickly as well.

Unless his crew mates can do something immediately, the commander will be the first human corpse on Mars. In our scenario of the near future the first explorers on Mars have survived a near fatal crash and a dangerous trek across a hostile planet. But now, a storm of abrasive dust has torn a hole in mission commander's spacesuit. It's the one thing the astronauts fear above everything else. You've got 10 or 12 seconds before you lose consciousness. You better exhale, right away. Empty your lungs, because otherwise they'll quickly expand and erupt.

The commander is unconscious his skin is turning blue. His crew mates have less than 90 seconds to get him through the ERV's airlock and administer emergency oxygen before his blood circulation ceases and his organs shut down forever. After you've lost consciousness, you hope that someone will hook you up to pressurized oxygen within the next minute and a half. If you don't get hooked up, you'll die for sure. If you do get hooked up, and you start breathing oxygen again, it turns out that, when you come to, there's usually not much permanent damage. The commander survives with seconds to spare. Despite his injuries, he will make a full recovery. Soon, the crew is back to full strength, working and performing experiments. The exploration of Mars has begun in earnest.

Mars to me would challenge all the expedition experiences that we've had throughout our history. It will take all the best lessons learned from all

past expeditions. The polar ones, the ones through the jungles, the ones through North America. Mars is a super-challenging place, it's very unforgiving.

Here on Earth, if things go wrong we can rely on having air to breathe and water to drink. On Mars, if something goes wrong, then the situation is automatically much more serious. But the astronauts have proven that they can adapt to the Martian environment. Like polar explorers, they protect themselves from the frigid temperatures. Like desert explorers, they learn to live with the ever present dust.

In our own desert station at the Mars simulation runs we brought a really superb microscope, but it was disabled by dust within a few weeks of it's arrival. On the other hand, some much cruder kind of microscopes, similar to the kind that college students use routinely, have proved very robust. In a frontier environment, you don't want to bring a racehorse. You want to bring a mule.

Not everything on Mars is more difficult than on Earth. The surface winds, for instance, are mild, too weak to threaten the astronauts or their instruments. The Martian atmosphere is only 1% as thick as Earth's atmosphere, and so if you're on the ground and a 60 mile an hour wind kicked up, you would only feel the force of a 6 mile an hour wind. We have here an anemometer, or wind-guage which helps us measure the wind speed, it's a very simple design really.

You've got these cups on top that capture the wind as it blows by and causes the cups to spin. You simply count the number of rotations of the cups, and it gives you the wind speed. It's a very simple design, very much the same as the one that was invented back in the 1800s, except, of course, with this digital readout. Because the atmosphere is so much less dense, and you have far fewer molecules of air sort of blowing on the anemometer, you would need a 20 mile an hour wind on Mars to feel what it feels like on Earth. So you can see the wind that's blowing at that speed is sort of lightly mussing your hair. If you were to have this on Mars, a similar wind speed that would give you the same sort of effect would be about a 70 mile an hour wind. So that's hurricane speed.

The astronauts do more than adapt to Mars. They extract water from the surface, and use Martian soil to grow food. Now, in terms of growing food, the things that can be grown most easily are leafy things like lettuce. At a certain point you're going to want to grow potatoes, which can create a great

deal of starch per square meter of farmland.

A year ago on Mars, four humans struggled to survive. Now, they are beginning to make a planet bloom. But it's only a beginning. For over a century, movies have perpetuated the idea, and the hope, that there is intelligent life on Mars. There isn't—Yet.

Unless, of course, if the Germans didn't make it in 1939.

But sometime late in this century, two people from Earth might give birth to the first Martian who may be the first of many more. We will be the Martians. But that's the future. For this first mission, time is running short.

Earth and Mars are at the right alignment for the journey home. The astronauts look forward to splashing down on the warm waters of the Pacific ocean. As they head back to that bright blue ball on the stars sprinkled blackness, another streak of light heads the other way. It's the second man mission heading for a rendezvous with another pre-positioned ERV.

There's plenty of risks associated with a human Mars mission. But if you look at human history, you know, one thing is clear, nothing great has ever been accomplished without risk, and nothing great has ever been accomplished without courage. If we send humans to Mars in our time, if we establish the first colony on Mars in our time, which is within our capability, then 500 years from now there would be new branches of human civilization on Mars and on many worlds beyond. It's the birth of the future.

5. UFO: The New Evidence

Thousands of witnesses have claimed to see UFOs. And their accounts are often strikingly similar. You have a crashed saucer, but also some crashed bodies. You have government cover-up. Mainstream science says the evidence just isn't there. Oh, my God. It's a big jump between a UFO and an extraterrestrial spacecraft.

But if UFOs were really extraterrestrial craft, what kind of mind-bending technologies would we find under the hood? You'd have to have some sort of technology that was capable of canceling the effects of inertia. When it comes to Unidentified Flying Objects, what is the real deal? For millions of believers, it all began on June 24, 1947. A businessman and pilot named Kenneth Arnold is flying solo near Mount Rainier, Washington. Suddenly he sees a group of nine aircraft moving at incredible speeds. They were highly reflective, and they were flying at supersonic speeds, in formation, changing course abruptly. The speeds were unattainable by our aircraftt at the time.

This was before the age of jets and certainly supersonic jets. Being a trained pilot, he did several things to corroborate their existence to make sure he wasn't seeing some kind of atmospheric effect. He changed his head angle. He changed the aircraft angle. He even positioned the aircraft such that there was a light snow in the background behind the objects, and they appeared dark against a light surface.

Before Arnold can maneuver closer, the objects are gone. It was basically unprecedented in modern times. No one had seen anything like this. In the days that follow, newspaper reporters misquote Arnold, as he tries to make sense of the incident. In fact, he said it moved like saucers skipping on water. The term "flying saucer" is born. And Arnold's encounter launches the modern UFO phenomenon. Weeks later, in the summer of 1947, an incident involving an Unidentified Flying Object is reported near Roswell, New

Mexico. Roswell has become the poster child of the UFO phenomenon, because it has all the necessary ingredients. You have a crashed saucer, but also some crashed bodies. You have government cover-up. There was some sort of cover-up. There was misinformation given out by the authorities. The original account put out by the air force at the time was that this was a flying saucer of alien origin. And then later, very quickly, it was denied, and the story then was that this was a weather balloon which had crashed and that there were no occupants on board and that there was nothing extraterrestrial about it. Other witnesses claimed to have seen actual pieces of a crashed spacecraft—materials that are reportedly unknown to science.

Both Arnold's sighting and the Roswell incident remain officially unconfirmed and highly controversial. Just about every year, there are thousands of reported sightings mostly in the sky, of objects that they assume are extraterrestrial craft— so-called UFOs. The "U" is important, of course. They're unidentified. I personally have seen a bright light start at the horizon and shoot off into the clouds. Now, strictly speaking, that was a UFO.

It's a big jump between a UFO and an extraterrestrial spacecraft. Scientists argue that most UFO sightings either have Earthly origins— like satellites, balloons, and aircraft— or cosmic origins, such as meteors, comets, or even an especially bright planet Venus. But when a UFO sighting has no known explanation, could it be an extraterrestrial craft? And if so, what kind of technologies could possibly explain the behaviors that witnesses actually report? How would such craft be built? And what problems would they have to overcome? A lot of the behavior of UFOs that people have reported are things that are beyond our current level of physics— extreme rates of speed or extreme acceleration, extreme turn rates, things that we're not capable of doing without extreme harm to a pilot or destroying a spacecraft.

Eyewitness accounts of super fast accelerations, lightning turns, and sudden stops seem to violate known laws of physics, but could aliens find a way around these laws? So what we have to keep in mind here is the principle of inertia. That principle, stated first by Isaac Newton, says that an object at rest or in motion tends to stay at rest or in motion unless acted on by an outside force. So, to generate these kinds of crazy changes in inertia, you'd really have to act on that object with an immense amount of force.

Following the same logic, a fighter pilot traveling near the speed of sound, attempting to make a 90-degree turn at the same speed, would experience something close to 300 Gs of force. The most that a human pilot wearing a

pressure suit can manage without blacking out is around ten Gs. If his physiology were remotely similar to humans, an extraterrestrial pilot undergoing a 300-G maneuver would instantly perish. His internal organs would continue moving forward and crush against the skeleton.

If they were similar to us, they'd probably must have a way of injecting fluid— internal fluid— inside their bodies so that they dealt with this problem of their organs floating around inside, and if they were strapped in properly and cushioned properly, end up not having internal damage when they accelerated and decelerated.

To effectively cancel the inertial effects on the craft itself, the pilots might switch on a technology that is beyond the reach of modern humans. So, in order to cancel out the effects of a 300-G turn and not be squished by that amount of force, you'd have to have some sort of technology or a device that was capable of canceling the effects of inertia.

The device would have to manipulate the force of gravity, using a type of force field to counteract the gravitational forces that rule the entire universe. This device, you could turn on if you wanted to, then turn it off if you wanted to, or maybe it would come on and off automatically. This is high technology that's out of sight. But if science can't yet explain how these craft could overcome the deadly problem of inertia, can it help explain their shapes—particularly the most famous shape of all—the flying saucer? In the late 1950s, the U. S. Air Force tested the Avrocar, but the design had poor stability and few aerodynamic advantages, proving that high speeds are unattainable for saucer craft in Earth's atmosphere.

The delta wing, or wedge shape, is a far stronger candidate— a fact that is well known by modern military aircraft designers. In fact, the percentage of UFO sightings reporting a wedge-shaped craft have increased in recent decades, a trend that mirrors the emergence of swept-wing jets and even flying-wing designs like the B-2 stealth bomber. The shapes that people have reported over the years have changed, with the most recent ones being more wedge-shaped. So, really, people's accounts tend to reflect the most advanced aircraft of the time. Beyond movement and shape, any attempt to explain the science of UFOs has to deal with the noise factor, or rather, the lack of noise. UFO reports consistently claim that the objects moved without making any sound. Almost all of these sightings, it's a real rule—there's no noise, which you would expect to hear from any fast-moving craft in the Earth's atmosphere. You would hear it.

What actually happens is that you get what's called a sonic boom, and that's a special pressure wave that sweeps through the atmosphere along with the craft. So you're on the ground, and that huge sonic boom is the result of that pressure difference between the front of the aircraft and the back of the aircraft as it pushes through the atmosphere.

Could an alien craft somehow cancel out the enormous pressure wave that supersonic flight generates? The answer could lie in the technology used in the latest generation of digital noise-canceling headphones. So there is such a thing as a sound-canceling technology, where you take a particular sound that you're interested in canceling and kind of broadcast the negative of that sound to cancel it out. Now, I'm not aware of any technology that's capable of doing that with shock waves. Canceling out the ear-splitting, body-shaking effect of a sonic boom would certainly require some advanced engineering skills. And if there is silence, what about invisibility? Some reports claim that UFOs simply disappear into thin air. One promising human technology currently being researched might explain such phenomenon. There is a technology on the horizon which might change things visually. And that is a kind of light-bending technology. As a class, they're called metamaterials. If you want to think about popular movies, think the invisibility cloak in the Harry Potter movies.

Metamaterials use combinations of polymer substrates, gold, and copper to forcibly bend electromagnetic waves around an object. The light is guided around the object rather than being reflected or refracted. But advanced materials, stealth capability, and mind-bending maneuverability would all come to nothing if our visitors were unable to get to Earth in the first place.

I'd say that the chances of another civilization making it here to visit us are pretty miniscule. But if they did make it, it would mean that they had solved a whole bunch of problems, including material-science problems that we don't have answers to. So they'd have technology far beyond ours, perhaps even beyond what we've dreamt of at this point. But scientists can imagine several ingenious technologies that could bridge the seemingly unbridgeable distance between the stars, including one explosive propulsion source that's so apocalyptic, we might see them coming light years away.

For decades, countless UFO reports have surfaced from cities and countries around the globe. But not all UFO sightings have been reported from the surface of planet Earth. On July 19, 2009, viewers of a NASA video feed from the space shuttle Endeavor reported seeing a disc-shaped object hov-

ering above the shuttle's mechanical arm. Space-based UFO sightings like this have purportedly happened throughout the history of manned spaceflight.

Are these some kind of unspecified cosmic phenomenon, or could it suggest the possibility that huge extraterrestrial starships are cruising the Milky Way galaxy? Space travel between the stars— it's a staple of science fiction, right? You see it every night on television. You see it in the movies all the time. But could we really do it, or could any species really do it? Well, the distances between the stars are enormous—really enormous.

Interstellar travel doesn't violate physics. It isn't that you can rule it out and say, "there's absolutely no way they can come here." It's just that it's very, very hard. Just traveling from the Earth to Alpha Centauri, our closest neighboring star at nearly 4 $^{1}/_{2}$ light years, is beyond the reach of our most powerful rockets. If an advanced civilization were to visit us from a distant star system, we can pretty much rule out that they would use chemical rockets to get here. Despite the impressive pillar of fire and smoke that we see during Apollo, Saturn V, or shuttle launches, chemical rockets don't get you very far in a solar system.

To give you some context for that distance, our furthest known space probe is Voyager 1, launched in 1977. It's been flying for 34 years at 45,000 miles per hour and only now starting to leave our Solar System. If its destination were Alpha Centauri, it would take over 56,000 years to reach even the closest star system. To engage in interstellar missions on time frames of a human lifetime, around about 50 years, we can see that we need to increase the speed that we can travel by at least a factor of 1,000.

Scientists have determined that the speed of light is a mind-blowing 186,000 miles per second. A spacecraft traveling the star systems would have to reach a significant percentage of that speed even to reach the nearest star. The biggest obstacle is weight. A chemical rocket exacts a huge weight penalty, because its entire fuel supply must be carried on board. We can calculate that even to reach 6% of the speed of light using chemical rocket fuel, you would need more rocket fuel than exists in the entire mass in the universe. So we really know that it's actually impossible to reach another star system using chemical rocket fuel.

If extraterrestrial visitations are even possible, their spacecraft must solve this problem. In 2011, NASA's Nanosail-D became the first solar sail to orbit the Earth. The ultrathin 100-square-foot sail uses sunlight, or photon pres-

sure, as a source of propulsion. One of the immutable limitations of rocket propulsion is the fact that any rocket has to carry its fuel with it.

A solar sail can take advantage of the naturally occurring resources, namely photons emanating from the sun, which can be used to propel that solar sail. Similarly, a hang glider can fly without any fuel or an engine just by taking an advantage of the natural resources we're surrounded by, namely the atmosphere and the laws of aerodynamics. To achieve sufficient speeds to tow a spacecraft supporting life forms, the sail would have to be huge, up to hundreds of miles in diameter. And because the photon pressure from a star would decrease the further the sail traveled, some have envisioned a concentrated laser beam directing energy at the sail.

Eventually and sadly, this hang glider and all hang gliders at some point have to land, but a solar sail riding a beam of laser energy could conceivably travel to the stars. The max speed of a solar sail—about 10% the speed of light. Travel from Earth to Alpha Centauri using laser-generated photons—about 45 years. Currently, NASA and other space agencies have plans for launching more solar sails. But there are other, more powerful sources of propulsion in the universe. In the 1960s, a method of propulsion was proposed where a spacecraft would literally drop a series of explosive charges out the back, and the force of the explosions would push the spacecraft forward.

The prototype was called the "Orion Drive," and there were actually a series of experiments done with conventional charges to show that it would work. The Orion Drive, however, was proposed to use nuclear charges. In order to simulate an Orion-style propulsion system, scientists rigged up a demonstration where they're going to put a small chemical charge inside this barrel, and we're going to lift this off the ground 50, 60 feet in the air. We're going to actually calculate the energy released in this explosion and compare it to a nuclear charge you might find on an actual Orion Spacecraft system. Our Orion spacecraft simulator is rigged and ready to go.

We're going to light off the charges inside, blow the can up into the air, and compare that with the energy release from a typical nuclear explosion that would be used on an Orion-style drive. The Orion Spacecraft, studied at Los Alamos in the late 1950s, proposed nuclear fission as its propulsion source. Fission energy is produced when the nucleus of an atom splits into smaller parts, producing free neutrons and protons that release tremendous gamma-ray energy.

The explosive charge in this small nuclear charge in the Hiroshima range would liberate about 27 million times more energy. Clearly, that's a practical propulsion drive for interplanetary or even interstellar travel. Because of the huge explosions that an Orion Drive would require, on the back of the spacecraft, you would have a huge, thick metal plate that would absorb the thrust of the explosion and a series of shock absorbers to keep the crew from getting jolted each time the charges went off.

The max speed of a nuclear-powered fission spacecraft—About 5% the speed of light. Travel time from Earth to Alpha Centauri— About 90 years. Despite its powerful fuel source, the fission craft is actually slower than a solar sail. Boosting speed would mean turning to another, more intense nuclear reaction. Fission technology is well known and understood. And we've been using it to generate power here on Earth for decades, but there's another kind of nuclear technology, and that's nuclear fusion. Fusion is the power source of the Sun. In the core of our Sun, the temperatures are so high, atoms are moving so fast that they slam into each other, creating new elements and liberating energy.

The opposite of fission, fusion energy is produced when two atomic nuclei fuse together to form a single, heavier nucleus. The result is a huge liberation of energy. A fusion-powered spacecraft was proposed in a 1970s study called "Project Daedelus." Its mission called for a trip to Barnard's star, some 5.9 light years distant. Instead of nuclear bombs, the fusion-powered craft creates the propulsion on board in a reaction chamber. The fuel pellets for the Daedelus class starship consisted of pellets composed of a deuterium-helium-3 mix. These would have been ignited by what we call relativistic electron beams. These are extremely high energy electrons that would have hit the deuterium-helium-3 pellets, caused them to fuse, and a huge amount of energy would be released.

The Daedelus design called for released energy every second for over two years. The spacecraft would have weighed 55,000 tons, most of which would have been fuel. The weight penalty for such a spacecraft would be high but an advanced civilization could eliminate the problem by mining the hydrogen fuel during its interstellar journey. Deuterium, or heavy hydrogen, exists in abundance on Earth, notably in seawater, but helium-3 is a much rarer isotope.

In our Solar System, it can be found on the Moon and in vast quantities on Jupiter and Saturn. Scientists have proposed using huge hydrogen scoops to mine the helium-3 needed to cross the void of space. So it's conceivable

that if you had a craft that was powered by nuclear fusion, you could go to another star system, and then use the hydrogen available from that star to refuel. The self-contained fusion-powered spacecraft could avoid a huge weight penalty and reach speeds that could allow near-star exploration in a reasonable time frame.

The max speed of a nuclear-powered fusion spacecraft— up to 15% of the speed of light. Travel time from Earth to Alpha Centauri—About 35 years. The immense costs, the logistics, and even the politics of nuclear-powered spaceflight long ago caused humanity to scrap any and all plans. But a sufficiently advanced society could trade nuclear propulsion for what seems like an impossible paradox—traveling at light speed without moving at all.

Can UFOs actually achieve the immense speeds required for interstellar travel? One potential answer may be buried 30 feet beneath the ground in America's heartland.

The Fermilab Tevatron Collider outside Chicago, Illinois.

Racing just below the speed of light, particles of protons and antiprotons are launched in opposing directions. They meet in a high energy collision. The impact produces gamma rays— the highest energy source known in the universe and potentially the key to interstellar travel. The best way of making antimatter here on Earth is to employ probably the most famous equation that Einstein taught us, which is $E=mc^2$, which tells us that for a certain amount of matter, we can get energy. It's a great idea because it's incredibly efficient.

You essentially take all of the mass in those particles and convert it into energy. But how can antimatter exist in the universe if it must be artificially manufactured? Antimatter definitely exists, and when it meets up with normal matter, it explodes in a burst of electromagnetic radiation. Now, we can make small bits of antimatter in laboratories, but we can also collect antimatter from space. Some cosmic rays, which are charged, very energetic particles coming from space, actually consist of antimatter. Currently, the super-collider is the only practical way to produce antimatter. And right now it's created in very small quantities. If we could figure out a way to both create and store enough antimatter, we would have a storable fuel which, when mixed with ordinary matter, would liberate a huge amount of energy at a rate way beyond what either fission or fusion can do. Because we know antimatter exists and we know antimatter can be created and stored, it is conceivable that an advanced civilization could create and harness the power

of antimatter in sufficient quantities to create an antimatter rocket.

An antimatter ship could achieve unbelievable velocities, cruising just below light speed, nearly matching the speed of a star beam streaking across the galaxy. Travel time from Earth to Alpha Centauri 4-$^{1}/_{2}$ light years distant—about 5 years. In human terms, the cost of creating enough antimatter particles to power such a starship would be astronomical. It might be affordable in alien currency, but an antimatter spacecraft like this comes at a high price. The gamma rays from antimatter propulsion are so dangerous, they could destroy the cell structure of any living beings aboard ship. This starship would have to include an advanced shielding mechanism to keep the crew alive. And at such high rates of speed, there are equally destructive threats in the universe.

Space is pretty empty, but if you were moving close to the speed of light, you'd need an extremely effective shielding system that would allow you to be protected from interstellar dust particles that would all but annihilate a spacecraft traveling that fast. But if space debris is so dangerous, why not avoid it completely? The solution might be one familiar to Star Trek fans, namely a starship that could achieve light speed without even moving. In effect, one would create what is called a "warp bubble"— the name taken straight out of science fiction— and that would involve compressing a region of space-time in front of a spacecraft and expanding a region of space-time behind a spacecraft while the spacecraft itself sat stationary inside this flat bubble. So one would effectively be riding a wave of space- time.

A warp drive may seem like pure Sci-Fi fantasy but in 1994, a well-respected young physicist named Miguel Alcubierre published a serious proposal outlining how to travel in a controllable space warp. There are huge obstacles to Alcubierre's warp-drive solution. The biggest is called "dark energy," a cosmic phenomenon recognized in 2011 when three scientists were awarded the Nobel prize for proving its existence. The simplest explanation that's been proposed for the phenomenon of dark energy is that there's an intrinsic property of space itself that makes it want to expand.

You can actually see it by looking at receding parts of the universe and seeing that there's this extra acceleration component, but it isn't a stored energy source like solar energy or other kinds of energy. And so it's not inconceivable— it's not beyond the realms of possibility that some advanced civilization existing somewhere in the universe has learned how to harness dark energy to create an exotic form of propulsion. But there's another obstacle to a workable warp drive.

The only known way to pull a spacecraft forward within a warp requires harnessing the intense energy of a black hole. The sort of simple notion is somehow to make a very concentrated bit of matter, extremely concentrated, on the level which would cause a black hole. If you could generate a black hole on a small scale, so to speak, you could dangle it in front of the ship and use its space distortion to sort of drag the ship along. And exactly how fast could a warp drive tow an extraterrestrial spacecraft? The clear implication of Alcubierre's work was that it should be possible, if you can make this design of a warp drive, to achieve speeds almost any multiple of the speed of light. Travel time from Earth to Alpha Centauri aboard a light speed craft powered by a space warp— about $4\ ^{1}/_{2}$ years or less, as long as everyone on board doesn't incinerate.

One problem with the Alcubierre drive is within that warp bubble, temperatures would rise to far hotter than the core of our Sun. That's hot. Just one more small problem to solve for the chance to reach planet Earth. But what if such an alien spacecraft were to arrive in Earth's atmosphere, riding in a warp bubble, towed by a black hole? It might not be the first mass-witness UFO sighting, but it would certainly be the last.

March 13, 1997

Thousands of people witness an optical phenomenon drifting across the Arizona skies. Reports of a series of bright lights in geometric patterns are widespread, including multiple sightings over Phoenix of a craft up to a mile wide with lights winking on and off in sequence. Reconstructing the events of that evening, the lights of the Phoenix lights were almost certainly flares dropped by an air force A-10 aircraft in conjunction with the human tendency to envision a solid shape connecting them. That's the best explanation for the Phoenix lights. Of course, that middling idea has been proven wrong since air-dropped flares cannot travel from Nevada to southern Arizona and still be lighted.

For many, the Phoenix lights incident was direct proof that a huge extraterrestrial craft had arrived. Some even called it a mother ship. The purpose of an extraterrestrial mother ship is fundamental to the theories of alien visitation. It's the only way to bridge the vast distances of interstellar space. The term "mother ship," I think, came into being around the same time that "flying saucers" as a term came into being. And I think the universal notion was you couldn't make an interstellar trip in a person-sized craft. You have to have something really large.

MARS: GOING HOME

An apt earthly analogy of a mother ship is that of an aircraft carrier. An aircraft carrier travels the vast distances across the oceans, but its purpose is to transport smaller aircraft which can then go on and engage in whatever their missions may be. If the journey to Earth is long, on the order of centuries or even millennia, the mother ship would be much more than just an aircraft carrier. There's the generational or "ark ship," which is a very large spacecraft that is essentially an enclosed ecosystem, in which generations of inhabitants expect to be born, grow old, and die over the long period it takes the spacecraft to reach its ultimate destination.

Perhaps with technology, such as suspended animation, biological alien passengers could be put to sleep and revived after the vast journey. Surviving such a journey would also mean surviving the destructive energy powering the spacecraft itself. One logical design solution, a cigar-shaped mother ship, is precisely what many UFO witnesses claim to have seen. For any advanced propulsion system, you would want to situate the crew as far away as possible from the engine source.

So one possible design would be a very long, thin design, with the engine located at one end of the spacecraft and then some kind of truss connecting the crew section as far away as possible so as to avoid damage from high-energy neutrons, x-rays, or gamma rays from the advanced propulsion system. If such ark ships have in fact visited planet Earth, the evidence would be overwhelming and undeniable.

Something all these exotic and advanced propulsion technologies have in common is that they all radiate prodigious amounts of energy, and so we'd be able to see them, like beacons on a lighthouse, from sometimes light years away. The concentrated emission of x-rays, gamma rays, or subatomic particles would be suspicious, because we don't see that in our environment locally under any normal circumstances. Beyond the obvious visual evidence, the physical effect of a mother ship approaching so close to the Earth's surface could be a terrifying form of apocalypse.

If, for whatever reason, this extraterrestrial technology or civilization chose not to turn off their engines, it could be catastrophic for life on Earth, as we would be bathed in high-energy neutrons, x-rays, and gamma rays. If it's something which is a version of a warp drive, then you're talking about space distortion, and you wouldn't want to be too close to any major mass, including the planet. Such catastrophic visitations assume that aliens are willing to risk their own lives in interstellar space. But there might be a better way. They could stay at home and explore the cosmos using a race of

thinking machines.

For many ardent believers in the UFO phenomenon, the Roswell, New Mexico event in the summer of 1947 is the defining alien encounter in human history. In popular culture, the most lasting detail from the purported crash came from the descriptions of extraterrestrial bodies found at the scene. In the ensuing decades, this vision of alien beings, known as "the grays," became the accepted standard in science fiction and recurring alien-encounter reports.

The oversized heads may explain an expected feature in alien biology— greater intelligence. The larger skulls would contain larger, more advanced brains compared to ours. Mastering the profound challenges of interstellar travel would certainly require great intelligence, but might it require something that is beyond organic biology? One area of science fiction where we might be making kind of a big mistake is to assume that the aliens are biological, that they're living things.

I think that the possibilities for the kinds of organisms which might travel between the stars are really wide open. And one possibility that has appeared on occasion in science fiction is machine intelligence. According to a recent earthly equation known as Moore's Law, the number of transistors on a single computer chip doubles every 18 months, meaning computer processing speed doubles. This trend has continued for more than half a century and is expected to continue through 2020 or later.

The exponential explosion of processing speed is opening the door on a staple of science fiction called "Artificial Intelligence." So, if you invent a thinking machine, 100 years later, that machine is not only smarter than you are, it's smarter than all humans that have ever lived. And that's the difference between artificial intelligence and real intelligence. Artificial intelligence can evolve enormously faster. But I think the form of AI that we find most both menacing and promising is the kind of AI that could in fact do what our brains can do, can think the way we can think.

At Stanford university's artificial intelligence laboratory, the future of truly intelligent machines is rapidly approaching. There are a few things that make AI difficult. One is we don't really know yet how to make computers learn as effectively as humans can. It seems that our computers today just aren't as fast as we would like them to get to simulate the learning processes that take place in the human brain. To demonstrate early-stage artificial intelligence, Stanford students designed a fighting robot— one that attempts to

learn as it fights.

Okay, so what it's doing now— it's trying to defend itself, so it's reacting to your motion. So, depending on how you move your sword, the robot will adapt to your motion and to your behavior. How important a step on the road to true artificial intelligence are robots like this? So here we are using artificial-intelligence methods, like learning methods, to adapt to the environment of the robot, but we are still not at a stage where the robot is really thinking. Today's computers are still far less intelligent than almost any human.

But in the future, I think computers could eventually reach, and maybe even surpass, human intelligence. And if that's the case, imagine that each of us has a computer in our wallet—a cell phone or wallet— that was as smart as Einstein or even smarter.

How will civilization change, and what are the amazing things we could do then? Advanced as it is on Earth, the fencing robot is but a crude analogy for the type of machine intelligence that could pilot an interstellar spacecraft. The immense obstacles of space travel, including the sheer time scale and cosmic hazards, build a strong case that a race of intelligent machines will make first contact.

But honestly, if interstellar travel really takes place, it seems sort of reasonable to not send the biological beings. I mean, they're fragile. They have finite lifetimes. Just as NASA sends robotic probes to explore the Solar System in advance of human explorers, our first contact with an alien civilization may be with its robotic probes.

Biological being or AI super being? Our vision of an extraterrestrial will remain mere speculation until first contact is made. But how long will we wait? And despite a lack of hard evidence, just how likely is the existence of another intelligent civilization? Some believe it is highly likely that the universe teems with life. The galaxy has been around for a long time. The Solar System's been around for quite a long time, but the galaxy much longer. And the stars in it— many of them are much older than the Sun and our Solar System. So the chances are, if civilizations are out there, they've been around far longer than we have.

If they exist, say, for 100,000 years, then the chances are pretty good, I think, they will have learned to either communicate across interstellar space or possibly to travel between the galaxies. Until first contact occurs, humanity will continue to scan the skies for UFOs. None have been proven to be

extraterrestrial craft so far, but that does not rule out the possibility that humanity may one day discover evidence of an intelligent civilization, either in the far-flung heavens or much closer to home.

END